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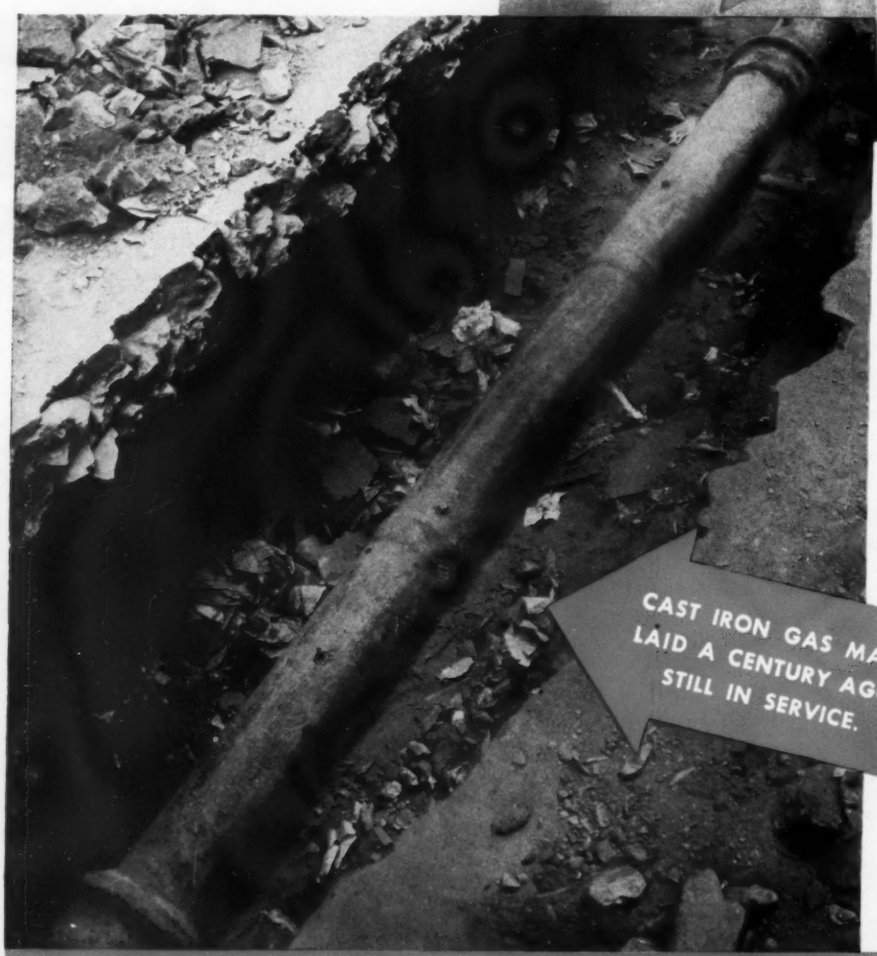

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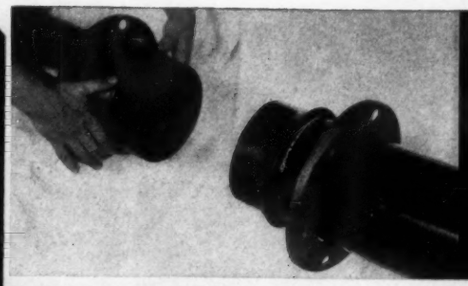
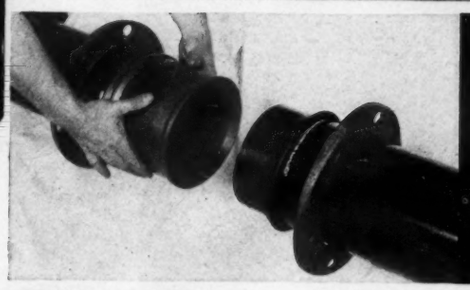
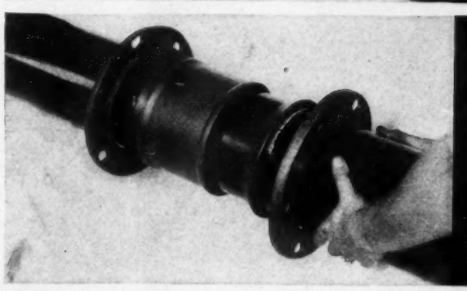


1. Place one follower, then one gasket on each pipe end, about six inches from the end of the pipe.



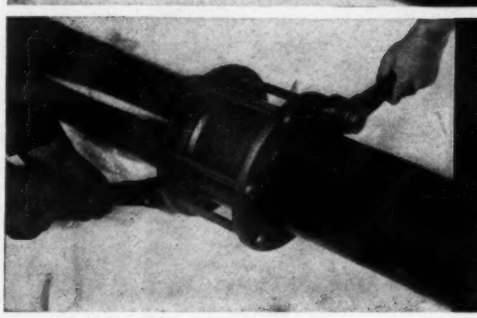
2. Shove middle ring over end of laid section of pipe until pipe stop or center bead on inside of middle ring comes up against the pipe end.



3. Stab other pipe end into middle ring until it reaches pipe stop.

4. Slide gaskets and followers up to and against middle ring, making sure gaskets are pushed under middle-ring flares uniformly at all points.

5. Insert bolts, and run up nuts to finger tightness.



6. Draw up nuts to final tightness with ratchet wrench, pulling up diametrically opposite bolts evenly and by progressive stages.

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December, 1936. Volume XII, Number 12. G A S is published monthly by Western Business Papers, Inc. at 810 South Spring Street, Los Angeles, California. Subscription price (in advance), 25 cents the copy. $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter August 20, 1936, at the post office at Los Angeles, Calif., under the Act of March 3, 1879. Copyright, 1936.

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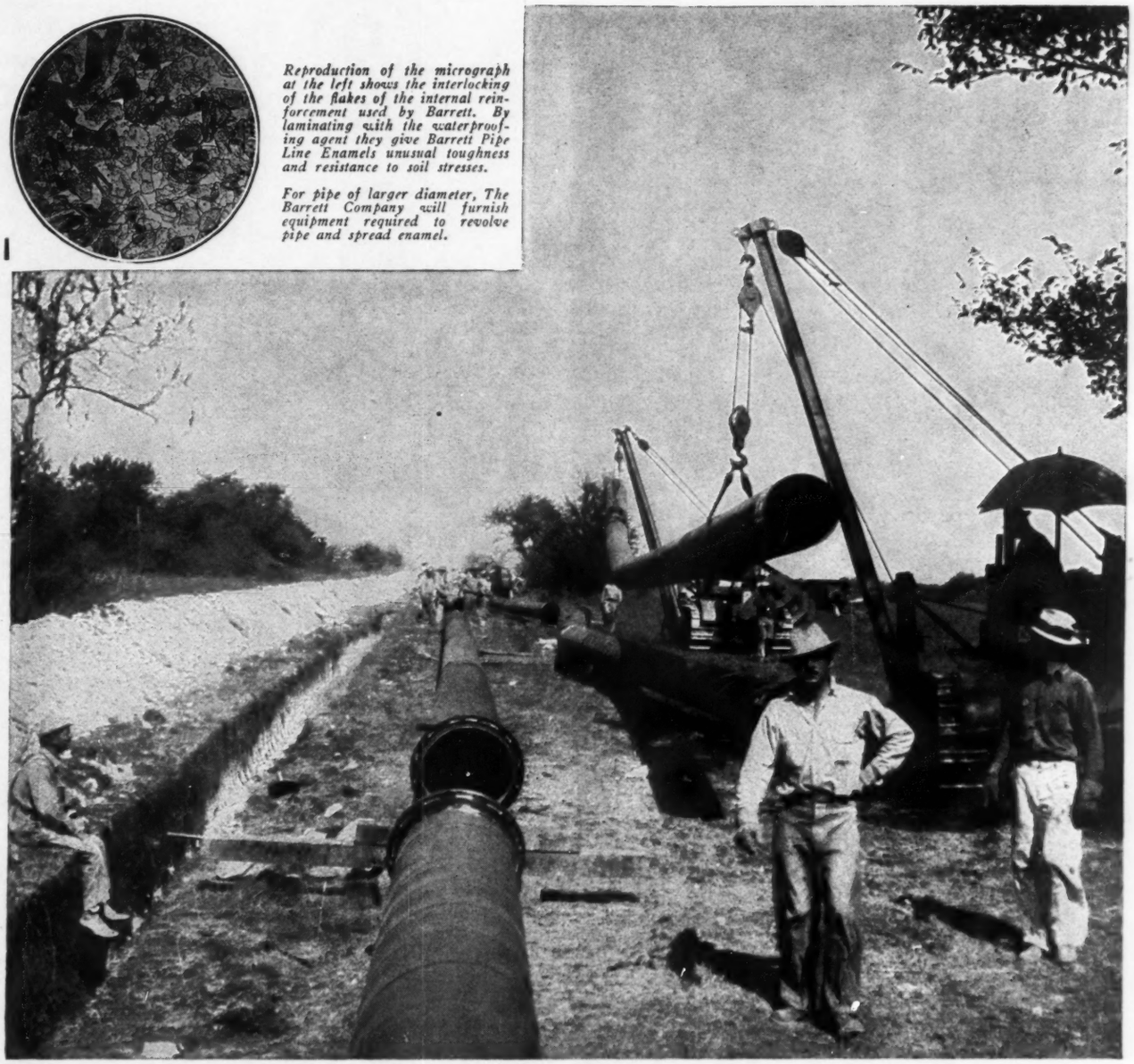

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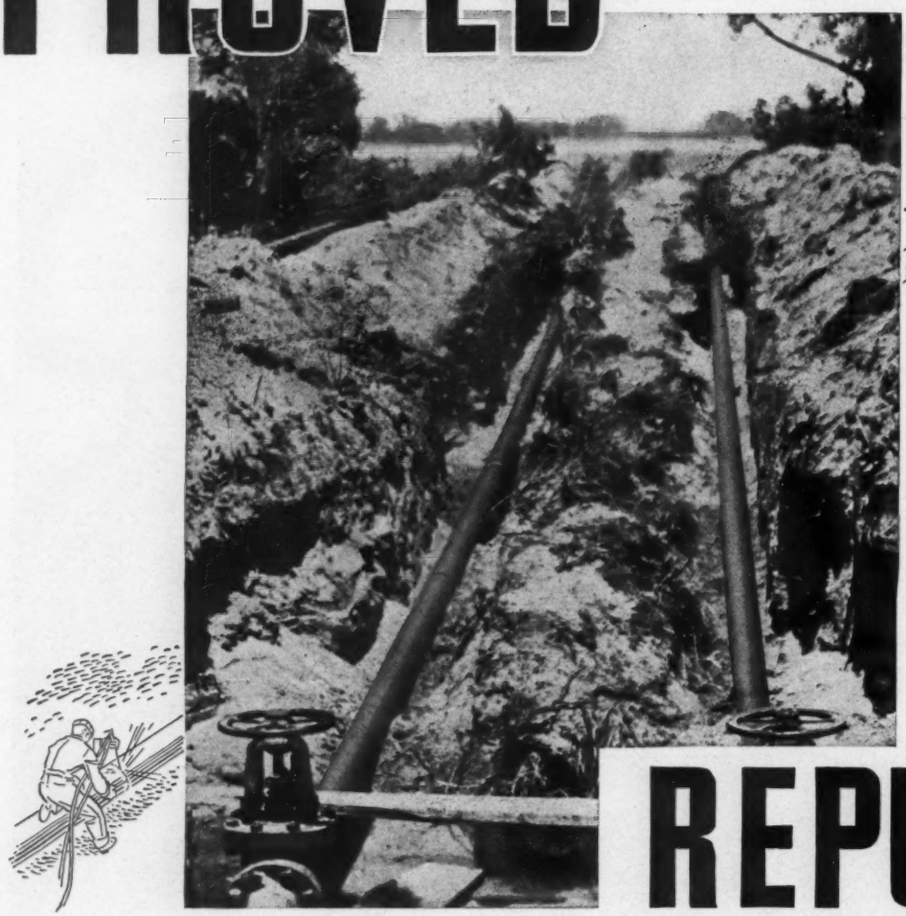

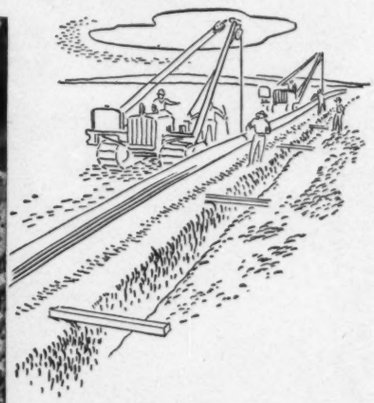

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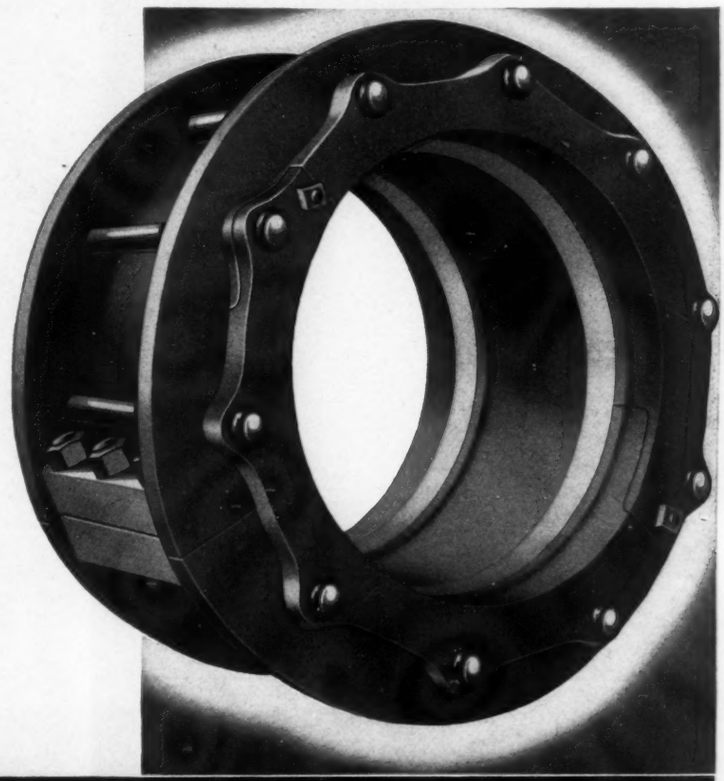

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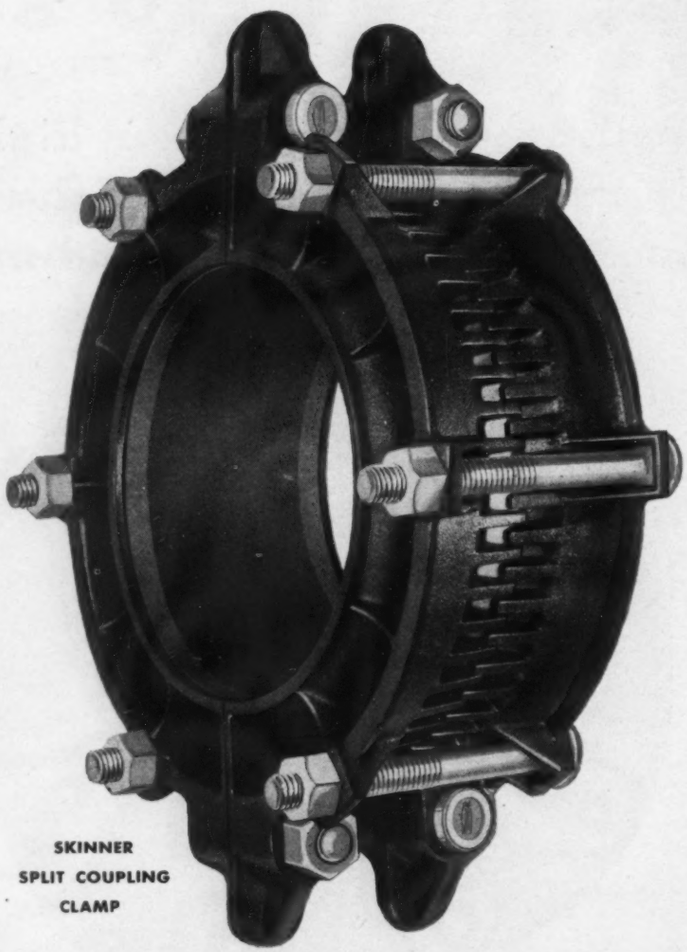

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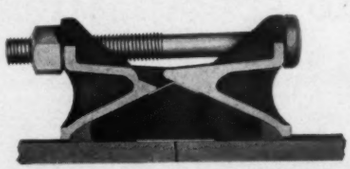

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M. B. SKINNER CO. *Est. 1898* **SOUTH BEND, IND.**

GAS
December, 1936

Guest Editorial

RESEARCH CONTROLS INDUSTRY PROGRESS

By HARRY L. MASSER

Vice-president and Assistant General Manager, Los Angeles Gas & Electric Corporation

WITH increasing competition, and increasing customer discrimination, the Gas Industry is now faced with the necessity of not only finding new sales outlets, but also of protecting existing business. Research, defined as a means of developing new gas utilization applications, and better ways of performing those at present in vogue, is a vital necessity.

To keep the industry in a healthy condition this research should proceed in all phases of our activity, but at the present time particular stress should be laid on domestic utilization, since household usage of gas is the backbone of the load, and without domestic appliances the business would cease to exist.

This domestic utilization research can be divided into two main sections: national, and regional or local. The national activity should be centralized, in the interests of efficiency and non-duplication, and carefully guided by a representative managing board, and deal with general investigation into fundamentals of combustion and appliance design. The regional or local activities should deal with special problems arising in that area, incidental to climatic conditions, civic ordinances, nature of gas supply, type and severity of competition, and field servicing problems.

As an example of centralized national research the work of the American Gas Association Testing Laboratories can be cited. This organization has produced, in the past, invaluable original data on such subjects as industrial combustion, performance of mixed gases, and design of pipe joints. The initial phase of an extended program of domestic gas research has also been completed with issuance of a first summary report on domestic gas range research dealing with controlling factors of performance of oven, broiler and top burner sections of existing models, both as received and after minor alterations. These data have been made available to manufacturers, and recent marked improvements in general design are no doubt a result of this information.

This gas range research is being continued in a series of basic investigations of fundamental design of oven, broiler and top burners. These burners will be operated in confined spaces, as in practical use, involving simultaneous consideration of aeration and venting. Range models will also be constructed, to study the effect of various designs and arrangement of parts.

Domestic gas water heater research is also commencing along equally comprehensive lines. Studies will be made of flue losses, heating surfaces and gas input rates to main and pilot burners. Heat losses from storage vessels, heater jackets, piping and other surfaces, will be investigated. Fundamentals of burner design, aeration and venting will be developed, and temperature control experimented with as to temperature gradients, thickness of insulation, flue gas temperatures and gas input rates.

Some utilities or regional groups have set up research laboratories to deal with local problems. An example is the laboratory recently established in Los Angeles, jointly supported by the three gas utilities serving that area. This laboratory has facilities and apparatus necessary to test and examine any type of domestic appliance, and includes a fully-equipped kitchen. Its functions are, in general, to assist the field service men in appliance adjustment problems, not only on existing equipment, but also on new models as they appear, and laboratory examinations have disclosed probable difficulties. It also thoroughly and impartially appraises performance of competitive equipment and works with manufacturers in development of features such as high output range top burners, and rapid preheat low temperature ovens, to offset such equipment. By comparison of various models, it observes and suggests means for general improvement in design and performance.

In the kitchen, cooking tests are performed under the guidance of the Home Economics department on new and unusual equipment; and answers to difficult customer complaints will be worked out. Research is being conducted along certain new lines, such as low temperature oven cookery, and smokeless broiling; and demonstrations will be made to individuals and small groups. It will be noted that this program is not designed to conflict with, or duplicate in any way, the work of the American Gas Association Testing Laboratories, but is, instead, entirely supplementary.

It appears particularly desirable to concentrate research along the lines where gas shows pre-eminent capabilities and completely surpasses other fuels: for example, in instantaneous water heating, where an unlimited quantity of hot water can be suplied, and in broiling where rapid preheat, intense radiant energy, and smoke consumption within the broiling compartment, can be realized. Other important uses that merit careful research are flood lighting, and gas engines for power.

As a goal to aim for in the future, thought should be given to the ideal gas appliance for each application. This ideal gas appliance, like the ultra-stream-lined automobile, may not find immediate application or acceptance, but will provide a mental stimulus to the Industry, and a fire to the public imagination.

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December, 1936

GAS

Vol. XII, No. 12

TWELFTH YEAR OF PUBLICATION

LOS ANGELES—810 South Spring Street . . 1064 Peoples Gas Building—CHICAGO

Appraising the Domestic Market By Dwelling Classifications

By W. J. CROWLEY and H. S. JACOBS

Public Service Co. of Northern Illinois

• In the course of an extensive study into the basic promotional requirements of the gas industry, Messrs. Crowley and Jacobs of the Public Service Co. of Northern Illinois in their paper, "Some Aspects of the Gas Industry's Marketing Problem," have developed some interesting facts on gas consumption as related to type of dwelling. Data compiled by the authors indicate that the gas industry would benefit by a more finely divided rate structure with respect to the use of gas for domestic purposes in dwellings of varying sizes and types. Excerpts from this paper are presented on this page.

For their work in compiling these data Messrs. Crowley and Jacobs were awarded first prize in the Employees' Prize Paper Contest recently conducted by the Illinois utility. The paper was also awarded first place in the Sales and Promotional classification of the contest.—EDITOR.

W. S. Crowley

H. S. Jacobs

IN a general way, the stratification and scope of the potential field for domestic cooking and waterheating is known, but for the type of marketing that the gas industry must undertake to maintain its position, more definite information is required. It is interesting, in this connection, to consider the relative importance of the domestic business now served by the electric and gas utilities. Table No. 1 gives some pertinent information on this subject for Public Service Co. of Northern Illinois in the Year 1935.

TABLE NO. 1. Domestic Electric and Gas Service.

	Electric Utility	Gas Utility*
Average No. Customers Served	234,580	129,193
Revenue	$8,150,616	$4,234,386
Sales in KWH or Therms	162,346,463†	19,833,720‡
Sales Expressed in Equivalent B.t.u. (Billions of B.t.u.)	554	1,983

*Excludes sales to domestic space-heating customers. †KWH. ‡Therms.

In revenue and number of customers the electric business is approximately twice as important as the gas business, but when actual energy delivered to customers is considered, the gas industry is by far the more important, the energy made available to the customers by the gas utility being 3½ times as large as that supplied by the electric utility!

It is well known that the most profitable fields for development by the gas industry are the domestic water-heating, refrigeration, and space-heating fields. Just what is the scope of the market for each of these services?

The fact that the single-family dwelling is already the largest source of gas industry revenue establishes it as the big potential market for domestic gas services. And the single-family dwelling offers also, opportunities for the sale of additional gas appliances as laundry stoves, incinerators, and clothes dryers.

It is evident that some measurement of the scope of the single-family dwelling market is an important gauge of the possibilities for expansion in any certain territory. The Public Service Co. of Northern Illinois, in a carefully conducted survey of its existing customers, found the distribution according to type of dwelling to be as shown in Table No. 2, which also gives indications of the present relative value of each type of customer by showing the average consumption per customer per month.

TABLE NO. 2. Distribution of Customers According to Type of Dwelling.

Type of Dwelling	Per Cent Customers	Av. Therms per Customer per Month
Single-Family	63.0%	15.503
Two-Family	21.3	10.725
Three-Family	3.1	9.330
Four-or-More-Family	12.6	7.164
	100.0%	13.240*

*Total average for all dwelling classifications.

From these data it is noted that the average customer in a single-family dwelling uses 45 per cent more gas than the average customer in a 2-family dwelling, 66 per cent more than the average customer in a 3-family dwelling, and 116 per cent more than the average customer in a 4-or-more family dwelling. This relationship becomes still more significant in view of the fact that the field for expansion in the case of apartment customers is definitely limited, while in the case of customers in single-family homes there is still much room for development.

If the development of potential business in single-family homes can be successfully promoted, will the new business be substantial as compared to pres-

TABLE NO. 3. ESTIMATE OF ULTIMATE POTENTIAL INCREASE IN GAS SALES TO DOMESTIC CUSTOMERS.
(Single-Family Homes)

Number of Rooms per Home	Present Average Consumption per Month (Therms)	Present Average Consumption of Large Users (Therms) Adjusted*	Estimated Average Potential Increase		Per Cent Present Customers Falling in Each Group
			Therms	Per Cent	
1	6.8	9.4	2.6	38%	.04%
2	7.4	11.2	3.8	51	.11
3	8.6	14.9	6.3	73	1.09
4	9.4	16.7	7.3	78	7.54
5	12.1	18.8	6.7	55	34.49
6	15.2	26.4	11.2	74	30.75
7	18.3	34.7	16.4	90	13.69
8	21.5	41.9	20.4	95	6.76
9	25.1	52.0	26 9	107	2.95
10	36.3	74.0	37.7	104	1.28
11	36.7	92.0	55.3	151	.46
12	44.1	100.6	56.5	128	.31
13 and Over	51.3	93.5	42.2	82	.53
All Homes	15.5	27.3	11.8	76%	100.00%

*Determined arbitrarily to be 90% of the mean of all cases falling between the third quartile and the upper limit of each class.

TABLE NO. 4. CONSUMPTION PER CUSTOMER CLASSIFIED AS TO TYPE OF HOME.

Number of Rooms per Home	Average Therms per Bill				
	Single-Family Dwellings	Two-Family Dwellings	Three-Family Dwellings	Four-or-More Family Dwellings	All Types of Dwellings
1	6.80	9.07	6.27	4.42	5.47
2	7.39	9.43	6 28	4.63	5.81
3	8.61	7.84	6.69	5.18	6.44
4	9.36	8.65	8.09	6.66	8.10
5	12.07	10.64	9.58	8.49	11.31
6	15.24	11.98	11.27	11.00	14.32
7	18.34	15.08	11.10	14.39	17.93
8	21.50	14.82	13.95	15.68	21.01
9	25.08	14.50	16.95	.....	24.20
10	36.28	19.25	.....	.....	34.00
11	36.72	.....	.....	.....	36.72
12	44.14	.....	.....	.....	44.14
13 and Over	51.29	.....	.....	.....	51.29

TABLE NO. 5. AVERAGE CONSUMPTION PER ROOM ACCORDING TO TYPE OF DWELLING.

Number of Rooms per Home	Average Therms per Room per Month				
	Single-Family Dwellings	Two-Family Dwellings	Three-Family Dwellings	Four-or-More Family Dwellings	All Types of Dwellings
1	6.80	9.07	6.27	4.42	5.47
2	3.69	4.72	3.14	2.31	2.91
3	2.87	2.61	2.23	1.73	2.15
4	2.34	2.16	2.02	1.67	2.03
5	2.42	2.13	1.92	1.70	2.26
6	2.54	2.00	1.88	1.83	2.39
7	2.62	2.16	1.59	2.06	2.56
8	2.69	1.85	1.74	1.96	2.63
9	2.79	1.61	1.88	.....	2.69
10	3.63	1.93	.....	.....	3.40
11	3.34	.....	.....	.....	3.34
12	3.68	.....	.....	.....	3.68
13 and Over	3.37	.....	.....	.....	3.37

ent volume? It is very evident that with available gas appliances, the average customer cannot be expected to increase his consumption beyond that of the average large user; and some allowance must be made for the fact that the present small user, in expanding his use of gas, would do so with newer and more efficient appliances. If, for sake of illustration, arbitrary adjustments are made for these factors, the total potential business might be determined as shown in Table No. 3. This illustration is based upon the expectation of 100 per cent saturation of the commonly used appliances. The method does, however, lend itself to weighing so that the anticipated results at lower percentages of saturation can be expressed if desired.

In similar manner the anticipated growth might be estimated for the 2-family, 3-family, and 4-or-more family dwelling customers. The combined results of the separate calculations would then give the complete picture for all potential business in the entire residential field. It is interesting to note that 100 per cent saturation of ranges, water heaters and laundry stoves alone would result in an increase of 76 per cent in gas sales to customers in single-family homes (based, of course, on the above premises). There remains then a tremendous untouched field for such services as refrigeration, air-conditioning, space-heating, refuse incineration, and so on. As far as these services are concerned, however, the gas industry has no previous mass experience, with the exception of space-heating, and therefore any forecasts of potential business in these fields should be made independently on the basis of experience gained.

The relationship used in Table No. 3 to determine existing potential gas business in the single-family home market, i.e., the relationship between size of home and consumption of gas, is in itself of considerable significance in connection with the gas industry's marketing problem. The prevailing idea, expressed briefly is, that although the use of electricity is proportional to the size of home, the use of gas is not. Table No. 4 shows the average number of therms per bill by room sizes for customers served by the Public Service Co. of Northern Illinois. There is a definite increase in consumption per bill for each size of home over the next smaller size. For the very small homes this is not proportional to the number of rooms, but that should be expected as very nearly the same relationship is shown in studies of average consumption per bill of domestic electric customers in small homes.

The close relationship between size of home and consumption per bill is better revealed in Table No. 5, which

(Continued on Page 30)

Over-all view of the large crowd attending one of the four cooking schools jointly sponsored by the Los Angeles Gas & Electric Corp. and The L. A. Examiner on four successive Tuesdays during October in Los Angeles.

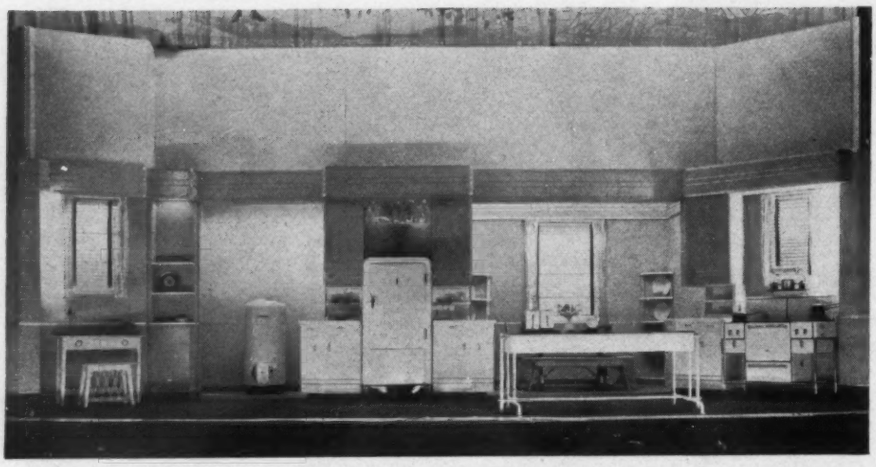
GAS COOKERY PLAYS TO 40,000 HOUSE IN THIS FOUR-SESSION SERIES

COOKING schools have long been a general practice of gas utilities in their efforts to sell gas and gas appliances. Unique, however, among cooking schools sponsored by major gas companies last year was the series of four schools recently conducted in Los Angeles by the Los Angeles Gas & Electric Corp. and the L. A. Examiner. This series constituted a definite attempt to gather in a central location as many women as possible for the purpose of selling by practical demonstration and by word of mouth the superiority of gas and gas appliances for modern cookery. That the schools were a success is readily seen in the attendance figures. Over 7,000 women attended the first school which was held October 6 at the Palomar ballroom, which was chosen because of its accesibility and size. Fifteen hundred women were unable to gain admittance because of space limitations. All in all the series of four schools attracted almost 40,000 women from all points within an area served by approximately 790,000 meters.

The series of schools, which were conducted on successive Tuesdays during October, was made possible by the cooperation of five large Los Angeles business institutions, the Los Angeles Gas & Electric Corp., the Los Angeles Examiner, and three metropolitan-district department stores, The May Co., The Broadway Department Store, and Barker Brothers. The gas company supplied speakers, demonstrations, and enlisted the services of the gas appliance manufacturers. The Examiner besides arranging for stage, screen, and radio talent to appear at each school, also through a publicity campaign published primarily in its Sunday edition, carried the story of the school throughout Southern California.

If size alone were the criterion by which the success of the schools might be determined, the appraisal of Addison B. Day, president and general manager of the Los Angeles utility, who said that "the cooking school was the largest ever presented on the Pacific Coast, and largest, I believe, ever held in the United States which means of course, in the whole world" might be a fitting tribute to the favorable reception of the series. An outstanding characteristic of the schools was the ostensible superior purchasing power of the audience as evidenced by the modern manner in which the great majority of the women dressed and by the newness of the automobiles which crowded the parking lot next door.

Several factors contributed to the success of the school. Prudence Penny, home economics director of The Examiner and widely known to Southern California housewives through her radio broadcasts and newspaper writings, proved to be a primary attraction, as did Victoria Warner, home service director of the Los Angeles Gas & Electric Corp. At each school entertainment numbers



The all-gas kitchen installed upon the stage at the Palomar ballroom from which one and one-half hour demonstrations were presented at each meeting of the school.

were offered by well known Hollywood personalities of the stage and screen. Other important factors bearing upon the success of the school were the accessibility of the Palomar ballroom, the adequacy of parking facilities, and the fact that comfortable seats were provided for the great majority of those attending. All-essential to the schools was the system of 26 loud speakers scattered throughout the hall, allowing each woman to catch every word that was spoken regardless of her distance from the stage. In fact, some women seated behind the stage and entirely out of view, sat comfortably knitting and listening to the program with the greatest attention.

To attain this objective, the primary feature at each school was the one and a half hour demonstration by Prudence Penny. Her recipes were designed to offer the widest diversification possible in the use of gas appliances. Recipes presented at the first school featured the preparation of a family dinner and were formulated to show to best advantage the various methods of using the oven and top burners of a modern gas range. At the second school a guest luncheon was prepared, and in offering these recipes, Prudence confined the demonstration in large part to the broiler. At the third demonstration through the use of the oven and Electrolux a buffet supper was offered. Hallowe'en refreshments were appropriately on the program for the last school, and a grand sweep in the use of the oven, top burners, and Electrolux played important roles in the preparation of these delicacies.

Distributed to the audience during each demonstration was a booklet entitled "Prudence Penny's Modern School of GAS Cookery." This booklet, which contained the recipes being demonstrated on the stage proved of great value not only in helping the audience to follow the demonstration but also in carrying the message of gas for modern cooking into thousands of Southern California homes. At the present writing, Prudence Penny receives daily requests for the booklet containing the recipes demonstrated.

Virginia Warner, of the Los Angeles Gas & Electric Corp., supplemented the demonstrations offered by Prudence Penny with short lectures at each of the four meetings. Each of these short talks was designed to drive home to the audience a specific point. In her first lecture, Miss Warner confined herself to the *economy* of using the top burner and a *thrift cooker* in preparing a meal. At the second meeting, Miss Warner emphasized the *oven dinner,* further educating the audience in the use of the oven heat control and the oven clock in preparing several foods to be cooked at the same time and at the same temperature. At another meeting she dwelt upon the *speed* with which jellied desserts and salads can be prepared using the Electrolux. Foods prepared in advance and illustrating each of these points were exhibited to the audience.

A featured half-hour event at one of the meetings was the lecture of John H. Grayson, inventor of the Grayson thermostat and clock, who was recently awarded the Addison B. Day Medal of Honor by the Pacific Coast Gas Association for his contributions to the gas industry. Mr. Grayson, in speaking on the oven dinner, gave a detailed explanation on the use of the thermostat and oven clock.

Still another means of selling gas by word of mouth was offered by each of the cooperating department stores. These varied from an illustrated lecture on kitchen designing, which proved of great interest, to the routine answering of questions by men stationed at appliances at the four meetings of the school.

As a means of checking attendance and for the purpose of gathering data on the potentialities of various Southern California districts as markets for gas appliances, each woman was asked to register on a small orange card asking for her name, address, and for the make and age of her refrigerator, gas range, and water heater. Numbered stubs attached to these cards were detached and used in the drawing for prizes. One hundred shopping bags filled with nationally-known brands of foods were given away at each meeting. A gas range was awarded as the grand prize at the fourth meeting of the school.

The cooking school program was periodically broken up during the course of each afternoon by the appearance of many well known Hollywood favorites of the stage, screen, and radio. Among these were "Jimmy" Wallington, from Eddie Cantor's radio hour; Betty Jane Cooper, dance artists from George White's "Scandals"; Lee Simms, pianist-composer; Ilomay Bailey, radio songstress; Murial Evans, motion picture star; Judy Janis, songstress; Phil Harris and his orchestra; and many others. Entertainment, however, was not restricted to the invited artists, as several of the appliance manufacturers produced amusing skits which received an enthusiastic reception.

In order to insure such a large attendance, it was, of course, necessary to precede the schools with an extensive promotional campaign. The burden of this fell upon The Examiner, and the campaign, under the direction of C. O. Davis, promotion manager for the newspaper, was conducted in the following manner. On the Sunday before a cooking school meeting, The Examiner carried a half page ad giving notice of the time and place, the names of the star entertainers, and a list of the prizes to be given away. This was supplemented by news readers scattered throughout the news columns, catch ads in the classified section, a story and photograph carried in the regular news columns of the paper, a story in Prudence Penny's ladies' column, and announcements every day over Prudence Penny's radio program. That the school carried exceptional interest and that The Examiner's publicity campaign had the strongest possible pulling-power are clearly seen when it was recorded that the first women to attend the first school which was scheduled for 1:30 in the afternoon, arrived at 8:30 in the morning. Further evidence of the interest in the school is seen in the fact that besides the 12,500 women who crowded the Palomar at the last meeting of the school, an additional 2,000 were turned away because the Palomar, large as it was, was un-

(Continued on Page 27)

Use of the Anti-Orifice Meter For Field Studies of Gas Flows

By HUGH E. FERGUSON

Plant Testing Engineer,

The Peoples Gas Light and Coke Company

THE constriction, or primary unit, now most widely used in flow metering is a thin-plate orifice—made of a plate inserted between flanges uniting two sections of a main. This plate is perpendicular to the direction of gas flow and contains a circular hole or orifice concentric with the axis of the main, the diameter of this orifice being approximately one-half that of the main.

H. E. FERGUSON

In an "anti-orifice" meter, instead of a plate held by flanges, the primary element is a circular disc whose diameter is approximately three-fourths that of the main, firmly suspended perpendicular to the direction of flow of gas and concentric with the main walls. In passing around this disc, the stream of flowing gas is deformed in a manner exactly opposite to the deformation of the gas stream passing through a standard orifice (see Fig. 1) —which is the reason for calling this type of flow constrictor an "anti-orifice." In the case of the orifice the gas stream is compacted inwardly, or concentrally, to a jet or cylindrical form. But an "anti-orifice" disc compacts the gas stream outwardly, or excentrally, to form an annular ring.

Because the mean degrees of distortion of flow are comparable, very nearly the same amount of work will be done on gases passing through orifices and anti-orifices of equal discharge areas, and decreases in pressure from the normal pre-constriction pressures will be comparable. The only apparent difference between the effects of gas flow streams, of the orifice and the anti-orifice, lies in the fact that in the case of the orifice "both the contraction and re-expansion of the gas stream take place without any appreciable wall-guidance or external friction"—while in the case of the anti-orifice the drop in pressure across the constriction is slightly increased by the friction between the gas stream and the wall at that point.

Because of the similarities in the mechanics of escape, it was believed probable that rate of flow through an anti-orifice could be expressed by a formula similar in construction to the basic orifice flow formula. This belief was supported by the results of tests made in the laboratory of the Plant Testing Department of The Peoples Gas Light and Coke Co., which consisted essentially of a comparison of operations and orifices and anti-orifices of the same discharge areas. From the data of conditions existing at these elements under similar rates of flow of air, a formula similar in form and function to the orifice formula has been derived for the anti-orifice.

The equipment used in obtaining experimental data consisted of a long pipe containing a carefully machined orifice and an anti-orifice having the same area of escape, placed in series—each of these elements being preceded by straightening vanes and a sufficient distance of unimpeded travel to reduce stream deformations.

The differentials across the orifices were determined at standard "flange tap" locations—i.e., they were based on the differences in pressure existing at the *circumferences* of the opposite faces of the plates. The anti-orifice differentials were based on the differences in pressure existing at the *centers* of the opposite faces of the suspended discs. The planes of opening of all pressure taps were parallel to the direction of flow in order to standardize impact or suction effects.

In the series of tests made at static pressures of from 0 to 6 inches of water column, ten anti-orifices were studied. Most of these anti-orifices were compared with orifices of similar delivery area in two series of tests—first with the anti-orifice preceding the orifice in the test pipe, and then for check purposes, with the orifice preceding the anti-orifice.

It was concluded that formulas for calculating flows of gases through orifices with flange tap connections can be used with a satisfactory degree of accuracy for calculating flows through anti-orifices, by using an anti-orifice factor which is 0.89 to 0.90 times the flange tap factor of an orifice having an escape area equal to the escape area of the anti-orifice.

Data taken at the orifice were used to calculate the rates of flow by use of the accepted orifice formula; and data taken at the anti-orifice were used to calculate rates of flow by use of the anti-orifice formula. In general, the results of the two sets of calculations agreed to within 5 per cent—the average difference of 52 pairs of calculations being +1.0 per cent.

Although the anti-orifice form of element has not been developed sufficiently to permit its use as a substitute for the thin-plate orifice in commercial gas sales, it has features which make it more desirable than the orifice for some metering problems.

The first feature is that because of its peripheral clearance, the anti-orifice will not tend to collect and accumulate dirt and condensates. Registrations of meters using orifices are occasionally in error due to the accumulation of fine dust or water to a depth of one or two inches at the upstream face of the plate; steam meters using orifice elements are

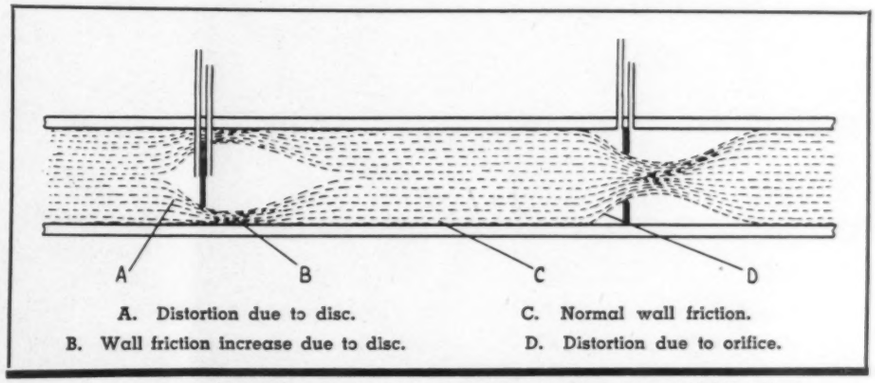


FIG. 1. COMPARISON OF FLOWS THROUGH ORIFICE AND ANTI-ORIFICE.

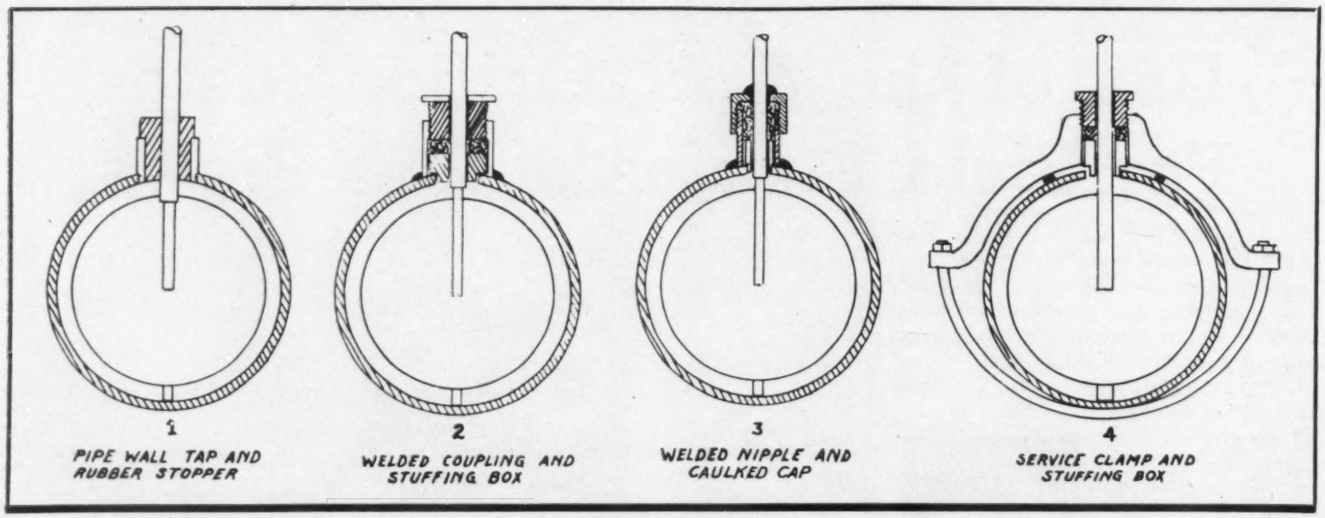


FIG. 2. METHODS OF SUSPENDING ANTI-ORIFICE IN MAIN.

frequently inaccurate until operation for several hours has re-evaporated the "starting-up" condensate which tends to collect ahead of the orifice plate despite drain holes in the latter.

A second desirable feature of the anti-orifice element is the location of the differential pressure taps in the *center* of the disc, and therefore in the center of the main. Because there is no flow of gas past these pressure taps, variations in velocity can not affect the integrity of the differential or pressure record (as happens when line taps used in orifice metering are slightly angled or burred). The pressure taps of the anti-orifice, being integral parts of the element rather than incidents of its installation, can be perfectly machined in a shop before installation. Whether or not the greater differentials obtained with an anti-orifice are due to impact-and-suction effects on the faces of the disc, has not been determined—but because the differentials are greater, the accuracy of their recording can be at least as great. Since the pressure tap openings are located at the center of the main, the differentials obtained more nearly approximate the mean of the differentials existing along all diameters of the pipe; line or flange taps used with orifices yield only the differential which exists at one end of the diameters. Because of its centrally located taps, distortion of the gas stream by bends or valves preceding the element will have less effect on the accuracy of the differentials of the anti-orifice than on those of an orifice.

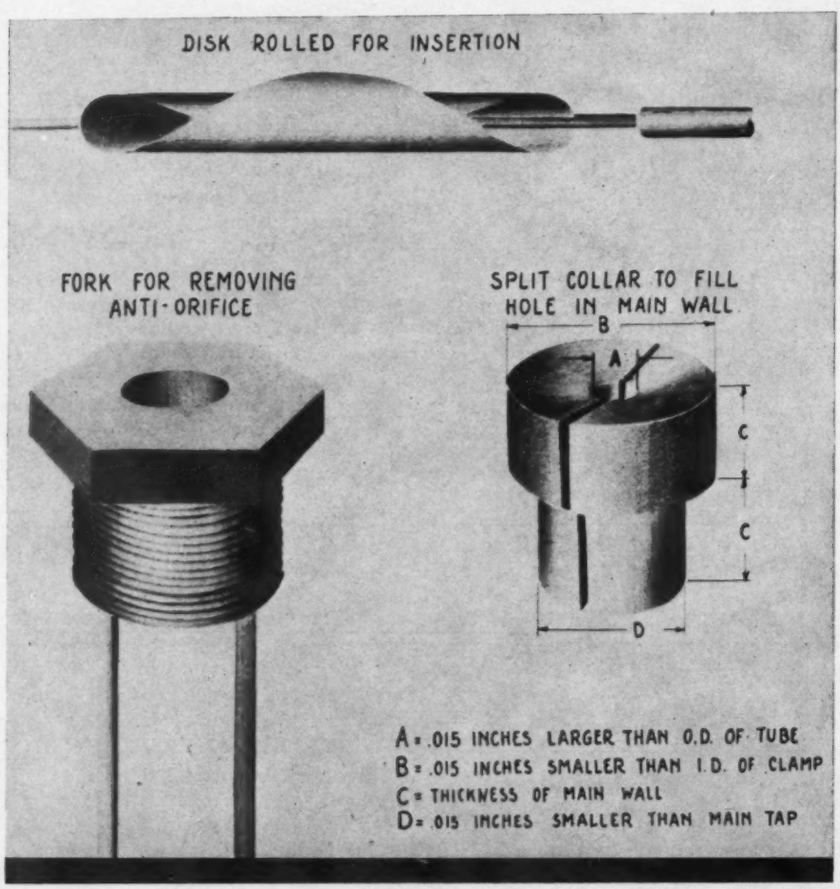

DISK ROLLED FOR INSERTION
FORK FOR REMOVING ANTI-ORIFICE
SPLIT COLLAR TO FILL HOLE IN MAIN WALL
B
A
C
C
D
A = .015 INCHES LARGER THAN O.D. OF TUBE
B = .015 INCHES SMALLER THAN I.D. OF CLAMP
C = THICKNESS OF MAIN WALL
D = .015 INCHES SMALLER THAN MAIN TAP

FIG. 3.

But the outstanding feature of the anti-orifice is that it can be made in a form that can easily be inserted in mains operating at less than ten pounds pressure without interrupting their operation. To do this, the disc is made of spring steel, and wrapped around the pressure taps to form a cylinder which can be inserted through an opening whose diameter need not exceed one-fourth the pipe diameter. Because the anti-orifice meter is intended primarily as a portable instrument for making measurements of flow "in the field" or street, this feature of ease of installation over-balances the objection that its present accuracy is only 95 per cent of that of orifice or impellor meters.

The primary element of the anti-orifice meter consists of a spring-steel circular disc suspended rigidly in the main by two hollow steel rods, concentric with the major axis of the main and perpendicular to the direction of flow. One of these hollow rods extends across the downstream face of the disc, and has a rectangular opening opposite the center of the disc face through which the down-

(Continued on Page 51)

GAS CAMERA

GAS Camera welcomes photographs of all gas industry activities showing personalities at work and at play. Pictures should be clear, and poses, informal.

PICNIC: H. C. Blackwell, president of the Union Light, Heat & Power Co., Cincinnati, Ohio, caught in an informal moment at the company's 31st annual picnic. Phlilip B. Stewart, chairman of the company's employee's mutual benefit association stands by.

GAS COOKLETS: Tiny Miss Emma Koestner, left, and Miss Bernice Leonard, two members of the famous Al Theis troupe which appeared in the midget theater during the Texas Centennial Exposition in Dallas are giving a mighty big cooking demonstration using natural gas.

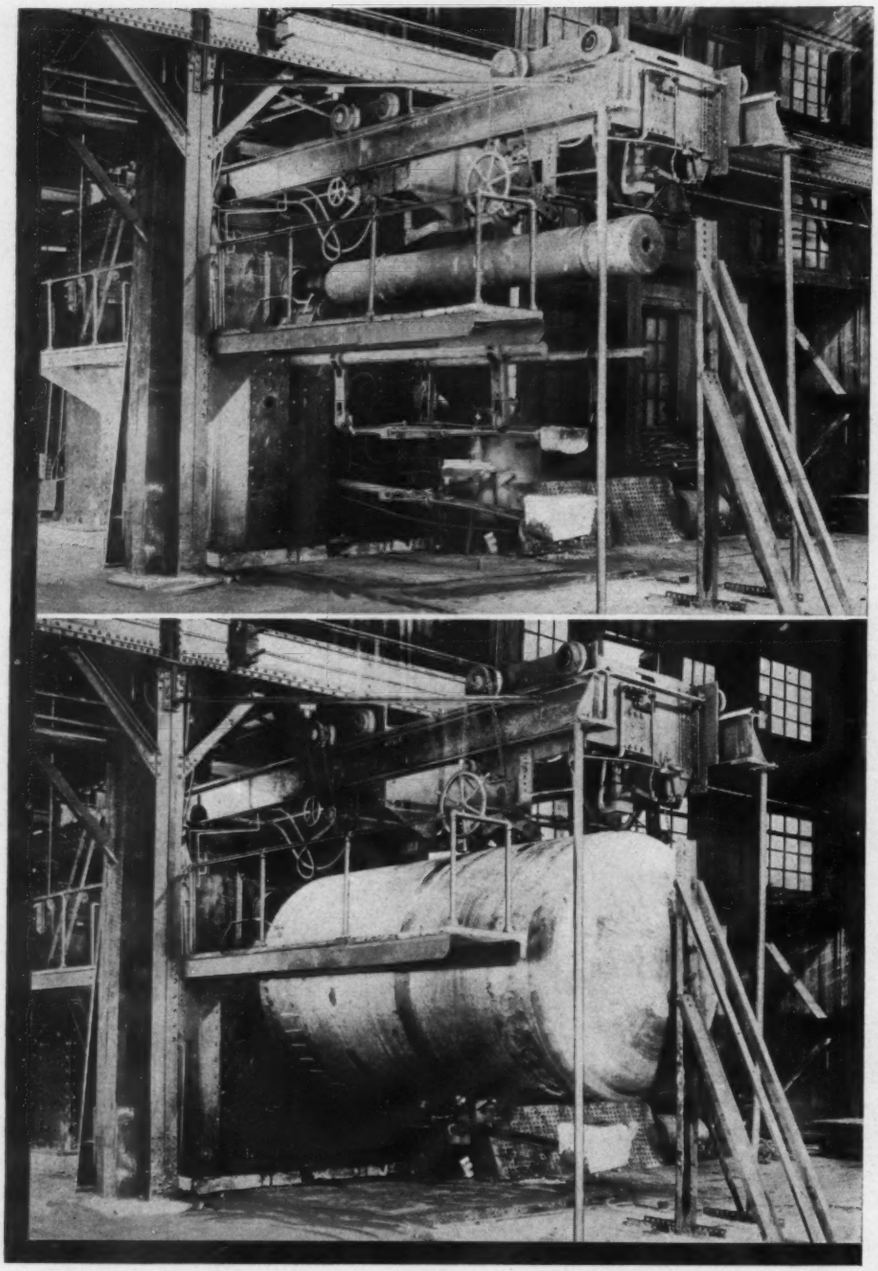
MODEL KITCHEN: A corner of the all-gas kitchen showing a new model refrigerator installed by the East Ohio Gas Co. at the Great Lakes Exposition in Cleveland.

MAKING THE ROUNDS: W. G. Russell, field representative for G A S, leaves the offices of the Laclede Gas Light Co., St. Louis, Mo.

NEON NOVELTY: Something new in signs has been erected at the Huntington Park office of the Los Angeles Gas & Electric Corp. Made of Mobilite tubing, it was developed by Dr. Richard E. Vollrath by packing the neon-type tubes with geometrically shaped glass.

FORGE

By J. B. NEALEY
American Gas Association



● Roller welder, above, showing mandrel, pneumatic hammer, and gas-fired forges. The head of the tank at the left has been welded in place by the roller welder.

FORGE welding, which was originally the blacksmith method of permanently joing metals by hammering them together when hot, has been modernized and mechanized in recent years. Fusion welding (gas, electric arc, or thermit) entails the deposition of metal at temperatures above 4000°F, while forge welding is accomplished at temperatures between 2600 and 2800°F. The coal or coke-fired forge and manual labor have been replaced with delicately controlled gas furnaces and power driven hammers and rolls. Forge welding with steam and pneumatic hammers was a natural step from the manual method, while the use of rolls or hammers is a comparatively recent development.

Water gas and natural gas have long been employed as heating agents. Until recent years, the Bureau of Explosives, the Interstate Commerce Commission, and the American Association of Railroads recognized only water gas as the heating medium for the manufacture of pressure vessels listed under their respective jurisdictions. However, investigation and tests have proven forge welds completed with transmutated natural gas are are equivalent if not superior to those completed by using water gas as the heating medium, and the Specifications have been altered so as to permit approval of welding completed by this process. The A.S.M.E. Boiler Construction Code, Paragraph U-85, Section 8, states: "The heating agent shall be suitably prepared water gas or *other heating medium* by which equivalent or superior results will be obtained."

The theoretical flame temperatures of blue water gas vary from 3575°F when made with bituminous coal to 3800°F when made with anthracite coal, while that of natural gas (1090 B.t.u.) is 3600°F constantly. In order to bring the steel to be forged welded to the proper plastic state, it must be soaked, to assure heat penetration, at a temperature of 2700°F. Water gas produces a high velocity, fast heating flame which tends to bring the surface of the steel up to the plastic state quickly while the core or center of the steel is comparatively cool with the result that a perfect weld can not be accomplished without very delicate manipulations in order to avoid over heated metal. On the other hand, natural gas affords a slow burning flame which makes soaking possible with an even distribution of heat throughout the cross-sectional area of the steel to be welded. In other words, if the metal is heated too fast, the surface may be at a welding temperature while the inside or core of the steel is still considerably below the welding temperature, resulting in a defective weld. If heated slowly by soaking until there is absolute temperature equalization between the interior and exterior of the metal, the weld is successful and proper grain structure is attained. Of course, the tendency described for water gas may be overcome with manipulations and is mentioned only to bring out the comparative ease with which natural gas is utilized as well as produced.

The Columbiana Boiler Co., Columbiana, Ohio, manufacturers of pressure vessels, tanks for tank cars, acid tanks, tin pots for tin plate mills, galvanizing kettles, annealing boxes for steel mills, etc., are the only producers in its line to use transmutated natural gas for forge welding. It has been using this fuel successfully for many years. To substantiate this practice, the Natural Gas Co. of West Virginia made a thorough investigation at the plant of The

WELDING WITH GAS HEAT

Columbiana Boiler Co. and an exhaustive report was prepared by the gas company's industrial engineer, who summarized this report as follows: "Natural gas as a heating agent is suitable to all heating operations. In its freedom from objectionable impurities, from ash-forming components and large quantities of inerts; in the calorific intensity of its combustion mixture with air; in the facility which it gives to the control of atmospheric conditions; in its ability to afford complete combustion with almost the theoretical amount of air thus yielding a minimum quantity of flue gases; in the ease which it gives to the control of rate of combustion and, therefore, to temperature, natural gas is in every respect equal to if not superior to blue water gas."

For the welding of many of its products, The Columbiana Boiler Co. uses natural gas in its natural state, but, in order to conform to various regulations, on other items it converts the natural gas to blue water gas by proportioning with steam, with the result that the products of combustion are identical to those obtained when using water gas alone and contain 45 to 55 per cent hydrogen. In this way water gas is produced much more cheaply than by burning coal.

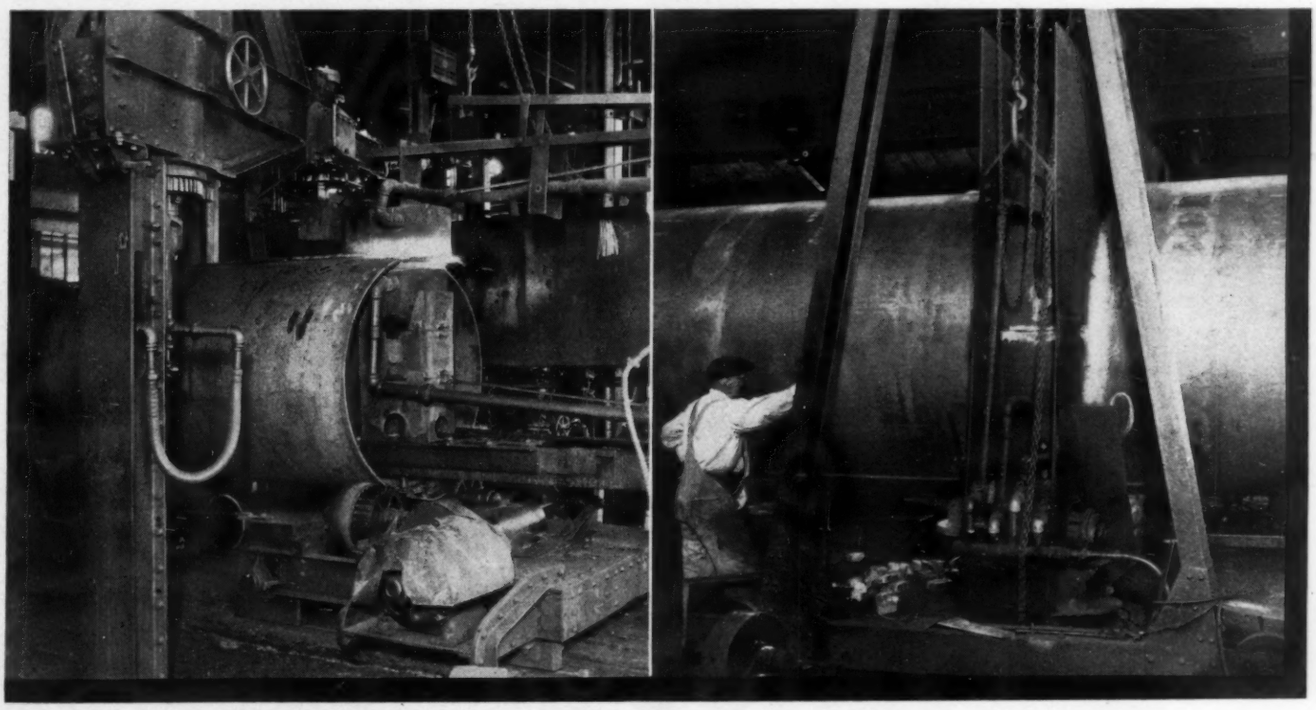
John Barrow and his four sons are the principal officials of The Columbiana Boiler Co. and these gentlemen have invented and patented forge welding machines including hammer and roll welding. The hammer welding machines are used in making the longitudinal seams of pressure vessels as well as circumferential seams, except head seams, which are accomplished on roll and hammer welders. The hammer welder consists of a long steel mandrel on which the anvil or bucker-up and the lower forge ride back and forth. Below is a truck on which rides a carriage carrying the tank or vessel to be welded. The shell plates for tanks or tank cars average 1 inch thickness and are of medium carbon steel formed into cylindrical shape in a pyramid roll capable of handling plates of any practical length. They are then stitch welded to form a shell section which is transferred by crane to the welding carriage and run into welding position. Rollers on the carriage in which the shell rests permit movement of the shell in any direction. This work is accomplished mechanically by remote controls located in the operator's pulpit. After the carriage and shell come to rest under the welder, the forges are positioned on the seam to be welded, one above and outside and the other below and inside of the shell. The hammer is swung from a post crane and can be moved horizontally in an arc or vertically. The outside or upper forge is handled by an overhead hoist and a section of flexible hose is inserted in all lines to allow free movement of both furnaces. The carriage in which the shell section rests is motor driven so that the movement of the shell to any position is a very simple matter. This work is controlled by one motor on the carriage from the operator's pulpit.

The forges consist of steel cases filled with refractory material with an opening of approximately 5 by 10 inches. A gas burner fires into this combustion space and when the two forges are in position, the flames impinge directly against the shell, one above and one below. When the heat has been applied for a sufficient length of time, the operator by pushing a button moves the forges away and at the same time the anvil and hammer slide and swing into position respectively. The operator then starts the hammer and at the same time moves the carriage and shell reciprocally until the weld is accomplished. The lap is reduced to the thickness of one plate. Another section of the seam is then heated and the process repeated until the entire seam is welded. Only about 12 inches of the seam is heated and welded at a time and the process is repeated several times so that from 6 to 10 hours are required to complete the seam, depending upon the length and thickness of the material.

The sections are then welded to-

(Continued on Page 58)

● **Below at left is the hammer welder, with gas furnaces in place, heating lapped metal edges preparatory to hammering. At the right: ring type annealing furnace, showing arrangement of gas burners.**



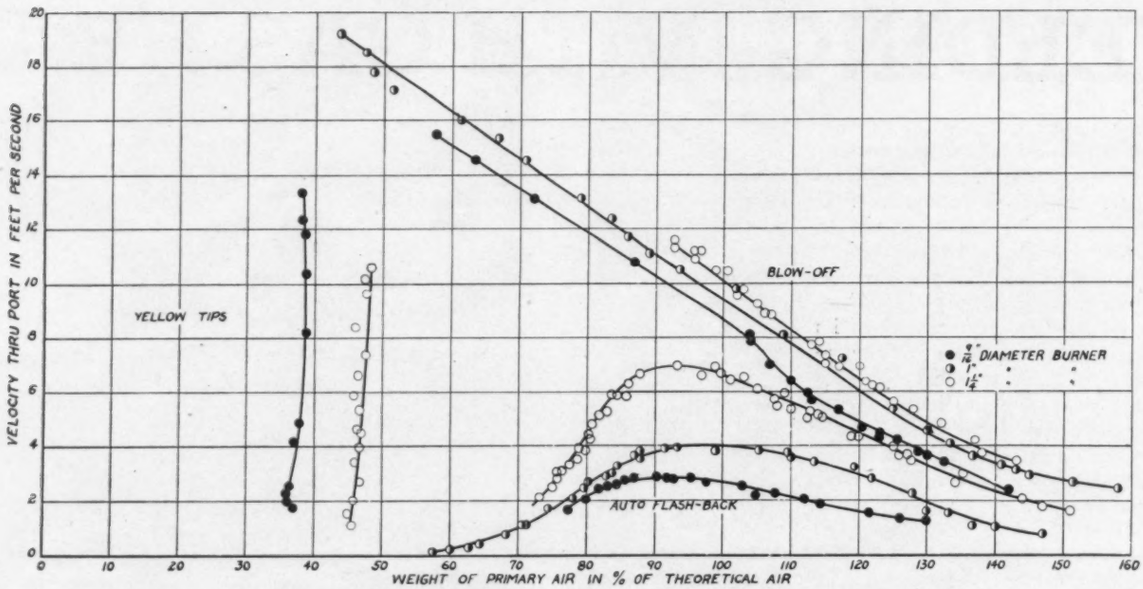


FIG. 1. Performance curves for single port burners

Characteristics of Natural Gas Flames

● **EVERETT D. HOWE, Assistant Professor of Mechanical Engineering, University of California, Berkeley, Calif.; addressing Technical Section, Pacific Coast Gas Association Annual Convention, San Francisco, Calif., August 25-28, 1936.—(Abstract by G A S).**

THE work upon which the following report is based is a continuation of that reported in Pacific Coast Gas Association Proceedings for 1935, Vol. 26, page 98. "Characteristics of Natural Gas Flames" by A. S. Leonard and E. D. Howe. The practical problem is that of the predetermination of the performance curves for an atmospheric type gas burner.

The discussion applies primarily to the Bunsen type of gas burner, i.e. the type in which a combustible gas is mixed with air before issuing from the burner ports outside of which the combustion occurs. The air passing through the burner ports is known as "primary" air to differentiate it from the "secondary" air which takes part in the combustion but comes from the atmosphere surrounding the burner. Most of the stove and furnace burners of the atmospheric type are of this general class, but, due to the large number of small ports used, are not suitable for precise experimental purposes. For this reason special single tube burners were designed, having diameters of 9/16 inch, 1 inch, and 1¼ inch, and all were water cooled.

The apparatus consisted of two metering orifices, one supplied with natural gas from the regular domestic supply and the other with air from a small blower; a mixing chamber for the gas and air with continuously converging passages; and the water-cooled burner receiving the fuel-air mixture from the mixing chamber.

The Flash-back and Blow-off curves were obtained by using the following arbitrary criteria: auto-flash-back was when the flame would flash back by itself in about 5 seconds after being lighted. The condition in which the flame was in the act of blowing off almost continuously and in which it blew off completely in 10 or 15 seconds after being lighted was about as critical a blow-off condition as could be easily identified. The rates of gas and air flow were measured for flash-back and blow-off throughout as wide a range as possible of primary mixture ratios.

Discussion of Results

a. *Performance Curves for Single Port Burners:* Fig. 1 shows the characteristic curves for three sizes of single port burners. The curves shown for the different sized burners are similar in shape, and the range of stable operation is greatest for the smallest burner. Pending further investigation it is recommended that multi-port burners be designed to operate with primary air between 50 and 80 per cent of the theoretical air and with mean velocities through the ports of 3 to 7 feet per second. These limits check also with Bureau of Standards results which were obtained with manufactured gases and multi-port burners.

These limits may be used in determining the feasibility of using the same burner head for several gases. The following calculated results are based on the assumption that the same rate of heat generation is to obtain in all cases and that the primary air is 75 per cent of the theoretical.

	Mfg'd. gas	CH_4	Natural gas	CO
Gas rate— lbs./hr.	1.52	.98	1.00	5.31
Primary Mixture rate— lbs./hr.	13.1	13.6	13.8	15.1

Since the largest part of the primary mixture is air, the mixture velocities will be directly proportional to the mixture rates given in the table. The extreme variation in these is about 15 per cent, whereas the permissible variation is about 100 per cent. Hence the same burner port area is proper for any of the above gases.

The complete design of the burner includes the proportioning of the gas-jet, air shutter and venturi tube. This problem is essentially one of jet pump design. Since the pressure changes throughout the burner-passages are negligible as compared with atmospheric pressure, such design can be made using the analysis for incompressible flow given in "The Water Jet Pump" by Gosline and O'Brien (Univ. of Calif. Press, 1934). According to these data the throttling of the gas supply would make the primary mixture richer, so that the burner, if designed for conditions within the limits suggested would produce a steady flame for all positions of the gas cock. An increase in the gas rate (lbs. per hour) as when changing from natural to manufactured gas would neces-

sitate throttling the air flow slightly to overcome the increased suction on the primary air.

b. *Prediction of the Flash-back Curve:* It was hoped that the results of the experiments with the single tube burners could be correlated in terms of the fluid flow characteristics and the velocities of flame propagation. Attempted correlations on this basis have been unsuccessful for two reasons: first because the definition used for flash-back permits wide variation in the observed results; second, because the velocity of flame propagation does not seem to have a set value for a given tube diameter.

Experiments have been under way to determine a more definite flash-back curve. For a given mixture ratio the primary mixture is caused to move along through a long glass tube with different velocities below the flash-back velocity. The flame speed relative to the tube is measured for each mixture velocity. A curve of flame speed versus mixture velocity is then plotted and extrapolated to obtain the mixture velocity for which the flame speed is zero. The values so determined for various ratios will define a new flash-back curve. The results so far obtained are not yet complete enough to be presented.

The second observation, namely, that the velocity of flame propagation in a tube has no definite value, arises from the fact that as flames move through glass tubes the flame front moves as a unit, being hemispherical in shape with the convex side in front. Since for the conditions studied the mixture was flowing with non-turbulent motion it would be expected that the velocity distribution across the tube would take the usual parabolic shape. Uniform speed of the flame front would then require that the velocity of flame propagation should vary along a tube diameter, being least at the sides and greatest at the center of the tube. This leads to the conclusion that there is no single velocity of flame propagation peculiar to a tube of a given diameter.

The phenomena now thought to be basic to the study of flame stability are ignition temperatures, limits of inflammability, rate of heat generation, heat interchanges and diffusion. The limits of inflammability determine the points at which the flash-back curves intersect the axis.

The Installation and Servicing of Gas Flood Lighting Equipment

● **E. C. PETERSON, Portland Gas Light Co., Portland, Maine; addressing Distribution Meeting, New England Gas Association.—(Abstract by GAS).**

THE first modern, gas-flood-light installation in Portland was for demonstration purposes only, the company obtaining permission from the city to erect a 3000 c.p. light in the center of a public square which had previously been the site of a police booth.

This installation was adjusted to consume 37,000 B.t.u. per hour or about 70 cubic feet of 530 B.t.u. gas.

Trouble was had with split and broken mantles. Sometimes the mantles would be gone entirely, resulting in excessive globe breakage. After experimenting with the gas and air supply, mantle and globe breakage was decreased by reducing the gas supply to 60 cubic feet per hour.

To reflect the general experience of those New England gas companies having gas flood-lighting installations, a questionnaire was sent out. The replies and general comments resulting therefrom are hereby tabulated:

1. How frequently must inspections be made to maintain proper operation?

The average of those companies reporting indicates that inspections should be made every five weeks. In Portland it is felt that, if inspections are made about every three weeks, globe breakage and pilot melting are reduced and customers are better satisfied. Mantles are not changed on every inspection unless they are broken or have been in service the required number of burning hours.

2. How many burning hours can be expected of a mantle?

About 200 hours seems to be the average.

3. Are there cases where the gas input may be reduced below rated requirements without seriously impairing the candle power output? Will this increase the mantle life?

One company has found from the standpoint of mantle and globe life that a rating of about 30,000 B.t.u. per hour for a 3000 lamp, and 15,000 B.t.u. per hour for a 1500 C. P. lamp is quite satisfactory. In Portland, this has been found to be true without seriously impairing candle power to the naked eye. Final air adjustments are made at night for greater incandescence after the light has been burning about one half-hour.

4. What can be done to prevent the melting of spark-plug-type pilots?

First, reducing gas input; thus reducing heat. Second, more frequent inspections, replacing of split mantles. One company says, "Use gas pilots."

5. What can be done to correct delayed ignition?

Clean points with a distributor point file or No. 00 sandpaper.

Portland has two of the new type of pilots having sliding contact points which have the effect of brushing when they make and break, tending to clean the film off at each operation. These same pilots have a shield extending over the points, protecting them from the possibility of flame impingement caused by a broken mantle.

The company answers that it seems that this is a problem of the manufacturer as company engineers have been unable to work out any method for delayed ignition, feeling that it is basically due to a wrong pilot design at present. No reason is known why the breaker points on the thermostatic cut-out could not be located outside of the heat zone with the thermostatic reaction transmitted to the breaker point through a simple rod and tube thermostat.

6. What can be done to correct delayed operation of the thermostatic cut-out?

Clean breaker points at the same time at which the globes are cleaned or the mantles are changed.

7. Have you experienced failure in the ignition wiring circuit?

Apparently, from the answers to the questionnaire, Portland is the only company having had that experience, finally resorting to a complete rewiring of two posts. This wiring may have been damaged in shipment.

8. If you have experienced excessive breakage of the small, porcelain, insulator tubes when installing pilot assemblies, what have you done to correct this difficulty?

This has been corrected by reaming out threads and holding the insulator tube in place by the set screw only. One other company had the same trouble and corrected it in the same manner. The new type of pilot has one heavy porcelain stem carrying both wires.

9. What is the average installation cost per light?

Installation costs average $84.97 in the five companies who submitted figures.

10. What is the average maintenance cost per light per month?

The average cost per month is $2.02 in the same five companies.

11. General comments on installation or maintenance.

One company in reporting a peculiar difficulty of one installation states that the main difficulty was due to the high-pressure governor's blowing its seal and that when this was resealed, air was admitted in the line which, on the next starting up of the lamps, caused an ex-

plosion and ruined the mantles and globes. This was traced to a creeping governor and, by repiping so that the pilot light on the domestic equipment took up the creep, the trouble was eliminated.

It was further revealed that on this same installation, a roadside stand, stoppage was experienced in the preheater tubes which, by analysis, was found to be silicate, indicating that road dust was being sucked in by the fan in sufficient quantities to cause this stoppage. This condition was resulting in high maintenance cost on this lamp. After a conference with air-filter engineers, a simple filter, using a heavy felt properly sized was designed and inserted on the inside of the lamp base over the entering air louvres. This worked satisfactorily during the two weeks it was in operation.

The manufacturers' instructions on installation and maintenance are important. This is particularly true in regard to proper pipe sizing, and the necessity of maintaining constant pressure and dehydration.

The writer suggests individual, electric, switch control on jobs where more than one fixture is installed. Globes are cleaned on the job, using a spray and gun of the same type as that used by filling station operators for cleaning windshields. He is satisfied that the most important step in regard to maintenance and better satisfied customers is reduced input.

FIG. 2. Longitudinal splitting of headers.

Design of Welded Joints for Gathering Lines, Manifolds and Drips

● L. W. TUTTLE, Public Service Co. of Northern Illinois (1936 Chairman A.G.A. Subcommittee on Pipe Joints and Pipe Materials) addressing 1936 Annual A.G.A. Distribution Conference, Memphis, Tenn. (Abstract by G A S).

THE tendency for operation at increasingly higher pressures, combined with the general utility of oxyacetylene cutting and welding for fabrication and the advantage of welding in preventing leakage as compared to other methods of construction, has led in some cases to the use of welded details without full appreciation of the design requirements.

Experience has demonstrated that high stresses probably from 15,000 to 25,000 pounds per square inch are both safe and justified for welded construction, so far as long overland and main line construction is involved. In the fabrication of specials, however, these normal expected stresses may be increased many times due to the imposition of concentration of stresses or to bending, and this must be designed for if the construction is to be safe.

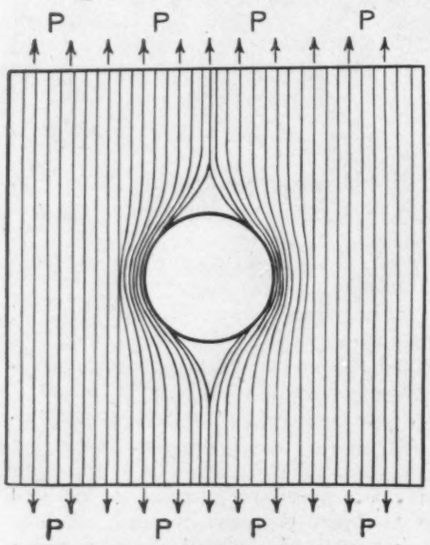


FIG. 1. Graphic illustrations of stress concentration around openings.

It is important to examine the effect of removing a part of the pipe for a nozzle, which can probably best be represented by a graphical illustration of stress lines as shown in Fig. 1, where a plate is assumed under a uniform load P acting in one direction. The stresses set up by the force may be represented as flow lines as shown in the figure, uniformly distributed if the load is uniform and if there is no opening, and with concentration of the lines considered as an index of the stress intensity.

If a hole is cut in the plate, the flow or stress lines must transfer around the opening, concentrating at the edge. It can be shown theoretically that for a plate stress in one dimension the stress intensity at the edge of the opening is three times that in the plate at a distance from the opening. Where the load stress is uniform in all directions, as in the head of a pressure vessel, the stress at the edge of the opening is theoretically twice the normal stress.

In pipe which is subjected to a hoop stress and also to a longitudinal stress of half the value of the hoop stress, the theoretical concentration factor is somewhere between two and three. The welding in of the branch pipe or nozzle, of course, reinforces the opening to some extent, but not enough to equal the pipe itself.

A few tests of headers made some time ago jointly by the Power Piping Society and The Linde Air Products Co. were reviewed. These tests were made on steel pipe with thicknesses much heavier than those used in the gas industry, but the significance was that these headers failed under hydrostatic pressures, producing normal hoop stresses in the pipe from 25,000 to 45,000 pounds per square inch or on an average of less than 75 per cent of the expected strength of the pipe based on a minimum strength of 45,000 to 50,000 pounds per square inch specified for the low carbon pipe material. Of particular interest is the method of failure which in every case occurred by the pipe splitting longitudinally at the top of the header where the nozzle connection makes a right angle intersection with the header pipe. Fig. 2 shows a typical failure of these headers. This is the critical point in nozzle or branch attachments as high concentrated stress occurs at this point.

It is of interest to examine the effect of such stress concentration with the high pressure stresses used in the gas industry. If the same high stress of 15,000 to 25,000 pounds per square inch, which is safe for a straight run of pipe, is used in the design of headers, drips and other fabrication details, it may be possible to have stresses as high as 30,000 to 50,000 pounds per square inch at critical points in the header. It can readily be seen that such practice is not safe.

High carbon content should not be employed for fabrication for pressures above 250 to 300 pounds per square inch. Practically all welding codes and specifications require that the carbon content should not exceed 0.35 per cent. For high pressures only low carbon pipe should be used and, if seamless, it should be that corresponding to Class A (0.10 to 0.20 per cent carbon) or Class B (0.20 to 0.30 per cent carbon).

Headers, manifolds and drips should

be designed for relatively low hoop stress, not exceeding 8,000 to 10,000 pounds per square inch maximum. If high bending strains are likely to be thrown on the connecting piping, then means should be taken to give the desired flexibility or adequate bracing should be provided.

The square or plate head shown in Fig. 3A should not be used for capping pipe more than 10 inches in diameter or for pressures in excess of 100 pounds per square inch. The blunt bull plug shown in Fig. 3B is not recommended for sizes greater than 16 inches or for pressures of more than 250 pounds per square inch. Because of the bending introduced at sharp changes in shape, the strength of such plug is reduced materially below that of the pipe. The fabricated orange peel bull plug shown in Fig. 3C is recommended for all pressures because of its more favorable stress distribution. However, for extremely high pressures in excess of 500 pounds per square inch, it is desirable to use the elliptical welding head, Fig. 4A, or the forged swage, Fig. 4B, should it be necessary to provide a small take-off in the head.

For pressures above 500 pounds per square inch where branch or take-off pipe is large, welding saddles, Fig. 4C, may be employed, particularly where bending is apt to be thrown on the branch piping. This saddle is not designed to reinforce the weld, as is often erroneously believed, but to reinforce the fitting. Welding tees, which are welded to connecting piping by butt welds, are especially recommended for high pressures as they are designed to take care of concentrated stresses.

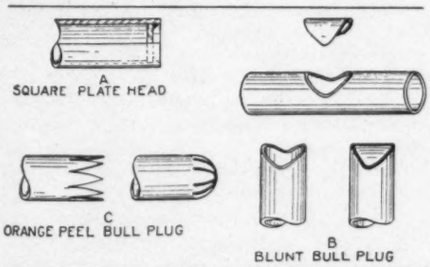


FIG. 3.

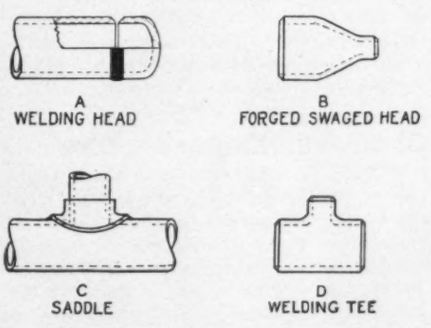


FIG. 4.

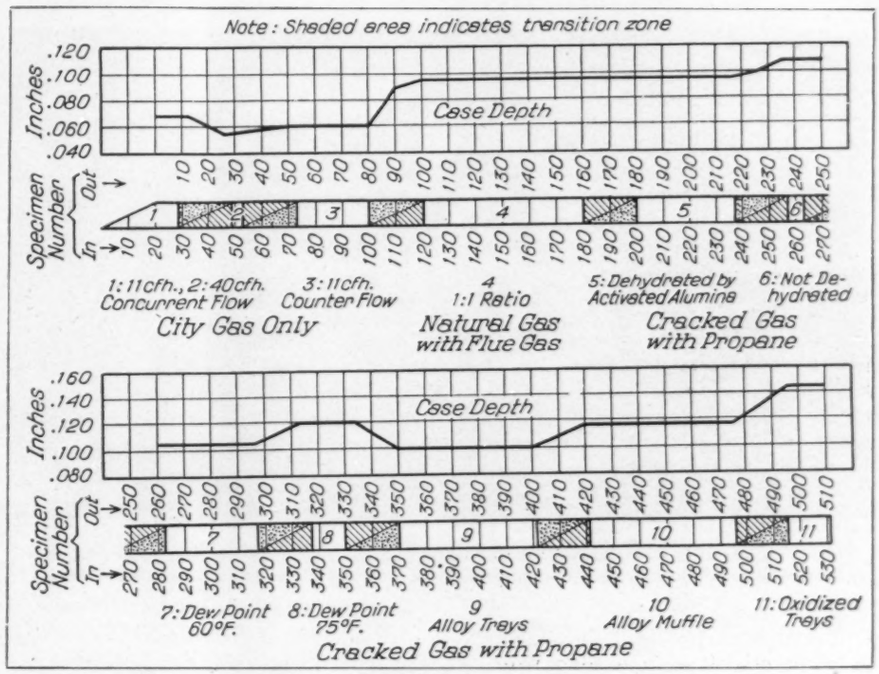


FIG. 1. Series of carburizing tests.

Factors Controlling Continuous Gas Carburizing

● R. J. COWAN, Metallurgical Engineer, Surface Combustion Corp., Toledo, Ohio; addressing Eighteenth Annual Convention, American Society for Metals, Cleveland, Ohio, October 19-23, 1936.—(Abstract by G A S).

A RAPID movement of gas over a metal surface causes a rapid carburization of the metal with the formation of a higher carbon content in the surface layers of the case as the flow increases; the depth of case varies also with the gas flow.

R. J. COWAN

It has frequently been proposed to use this idea in the continuous process by increasing the flow and causing an agitation of the gases within the muffle. This has been done in different ways in a number of test installations so that the results obtained are such as would be applicable to existing commercial operations.

These tests reveal the fact that an increased gas flow has resulted, in each case, in the production of very nonuniform carburization. This is due to the fact, perhaps, that a rapid movement of the carburizing gases over parts of irregular shape produces on some portions a deep case and on other portions a shallow case in accordance with the movement of the gases over the surfaces exposed. An attempt to increase the movement of these gases seems to result in stratification which would be very difficult to overcome even by means of extreme agitation.

To obtain uniform carburization which will extend to all parts of the load within the cross section of the muffle, it has been found to be desirable to cause the gas to enter the muffle in such a way as to avoid agitation. The gas circulation that occurs within the muffle is due, therefore, to the action of convection currents which bring about by means of their uniform movement a positive circulation that is in accordance with the temperature distribution within the muffle and which completely surrounds all surfaces of the parts that are being carburized and produces uniform results.

The use of propane or butane as the hydrocarbon carburizing gas is being carried on in a number of installations. Obstacles have been encountered in connection with the formation of tar which occurs when these gases are heated. The slow heating that takes place in that part of the furnace where the work is coming to temperature, brings about a polymerization of the hydrocarbons and the formation of liquid condensable products which tend to accumulate in any convenient pocket that may be found in the steel itself. These tars so deposit-

Group of gas men who manned the gas exhibit booths sponsored by the Industrial Gas Section of the American Gas Association at the National Metal Exposition in Cleveland, Ohio, last October.

ed are then carried into the high temperature carburizing zone along with the work where they result in the formation of hard carbon or coke upon the surface to be carburized, thereby interfering with the uniform carburization of the metal surface. This coke is metallic in luster and seems very similar to iron scale in appearance so that it is easily mistaken for iron scale.

A combination of two separate ways has been used to overcome this coke formation. One is by dilution with a carburizing gas high in hydrogen and the other is by introducing most of this gas into the high temperature zone of the muffle. The high hydrogen diluent lowers the tendency toward tar formation by retarding polymerization and bringing about at high temperatures pyrolysis of the hydrocarbon into hydrogen and carbon that is free from the objectionable features. By introducing most of the gas into the high temperature region, the thermal breakdown is so rapid that the unsaturated hydrocarbons are unable to persist and the lower and more stable saturated series bring about carburization without these interfering reactions.

A change in mechanical construction of the unit has been necessary to make it possible to take advantage of these facts. Instead of forcing all of the carburizing gas into the muffle at the charging end, a number of additional inlets have been placed at regular intervals along the top of the muffle from one end to the other of the furnace.

In order to determine the effect of various atmospheric conditions upon the process of continuous gas carbonizing there was set up in the laboratory a small furnace adapted for continuous operation in which material could be carburized in a controlled atmosphere and allowed to cool slowly before being removed into the air. The parts to be carburized were placed in steel trays, which were charged at one end of the muffle, moved progressively along the furnace length and discharged at the opposite end of the muffle. A series of tests were run, as shown graphically in Fig. 1.

At the base of this chart there is deignated by the appropriate numbers the different series of tests given above. The transition zones between tests are marked out as already described. The numbers shown represent individual specimens each of which was taken from a single tray. The carburized case depth of each is recorded by a graph placed above each specimen number. The temperature was held at 1750 degrees Fahr. (955 degrees Cent.).

The first three tests of this series represent results obtained by the use of Toledo city gas of the following composition:

	Per Cent
CO_2	2.8
O_2	0.3
CO	8.4
H_2	48.1
Unsaturates	4.1
Methane	33.1
N_2	3.3

The conclusions that may be drawn from this series of tests appear to be as follows:

1. The matter of gas flow is important and should be carefully established for each installation.

2. The carburizing gases do not need to be thoroughly dried, but will function efficiently in the prescence of considerable water vapor.

3. Alloy trays containing 35 per cent nickel and 15 per cent chromium have an effect upon the carburizing reaction which must be taken into consideration. (Experience has shown that after having passed through the furnace several times and having been thoroughly carburized this alloy effect is greatly reduced.

4. The alloy that is used in the muffle has but very slight effect, if any, upon the carburized material.

5. The presence of mill scale upon work to be carburized accelerates the carburizing rate. This observation has been confirmed in practice.

■ ■

Public Service Shifts Staff As H. L. Judd Resigns

HOWARD T. EAST, assistant to C. W. Bradley, vice-president in charge of sales of Public Service Co. of Northern Illinois, was appointed superintendent of the Oak Park district of the company on November 16, replacing H. L. Judd who is retiring in January after 34 years' association with

H. T. EAST

J. R. PERSHALL

the company. Mr. East was appointed assistant to the vice-president in 1927, having joined the organization in 1924.

The customer contact and dealer-relation activities of the company formerly directed by Mr. East will hereafter be under the supervision of C. G. Bennett, assistant to the vice-president.

Other changes affecting the sales department are the appointment of J. R. Pershall, advertising manager, to the post of advertising and merchandise sales manager. G. K. Hardacre has been appointed merchandise sales promotion manager and H. C. Wells, assistant merchandise sales manager. F. J. Stanton has been named chief clerk, sales promotion department.

C. F. Henness, manager of industrial gas sales will co-operate in the promotion of gas merchandise sales, and C. A. Gilkerson will assist in the promotion of gas house-heating.

G. D. Carlson, supervisor of customers' service department, has been appointed superintendent of the Elmhurst district recently created when the Maywood district of the company was divided.

■ ■

Chadwell, Engineer, Dies

William H. Chadwell, construction engineer of the Public Service Electric and Gas Co. of New Jersey, passed away October 13 at his home in East Orange, N. J., age 57. Graduated from the Stevens Institute of Technology in 1900, he was employed by the Essex and Hudson Gas Co., which was at that time affiliated with the New Jersey company.

Estimation of Natural Gas Reserves

● **JOHN WELLINGTON FINCH, Director, U. S. Bureau of Mines, Washington, D. C.; addressing Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

WHEN gas reserves are discussed probably a majority of producers hope for figures showing great quantities and long life. People in such a group probably are disappointed because an outright statement in years cannot be given. The future of the industry depends upon many factors besides the quantity of gas underground. The broad engineering, industrial, and economic view calls for careful analysis to avoid immature conclusions that might retard constructive thinking and action. We must consider not only the known quantity of gas in developed fields, and its economic availability, but also the probabilities and possibilities of discovering additional reserves, the effect of increased knowledge and improved technique in geology and geophysics, improvements in drilling and production practices making possible recovery of gas from deeper horizons, advances in conservation of natural gas not only in dry-gas fields but also in oil fields through decreased gas-oil ratios and better utilization of reservoir energy, possibilities of storing surplus gas in natural underground reservoirs, improvements in pipeline transportation making practicable the delivery of gas from more remote sources, increased efficiency in use of gas, possibilities of mixtures of natural gas and gases from other sources, and many other factors.

Proved physical laws enable the quantity of gas contained in a natural underground reservoir to be computed with considerable accuracy, if we have adequate data concerning the character of the reservoir and of the fluids within it. Given the volume of a gas-filled space underground, the pressure, temperature, and compressibility of the gas within it, relatively simple computations can determine the quantity of the gas. This is the "saturation" or "pore space" method of estimating "gas in place". Also, if we know the pressure, temperature, and compressibility of the gas in a natural underground reservoir at the beginning and end of a period of production, and know the quantity of gas produced during that period, we can compute the volume of the reservoir and the quantity of gas within it, provided we know that the volume of the reservoir has not changed, or how much it has changed. This is the "pressure-volume" or "pressure-decline" method, which can be used satisfactorily only when there has been considerable production from a field. In many cases both methods can be applied, using one to check the other.

In general, however, an estimate made early in a gas field may not hold throughout its life. A careful engineer will include only the gas which he considers to be proved beyond reasonable doubt. As the field develops, more gas may be proved, and ultimate production exceed early estimates. In other cases, however, data may be insufficient or faulty and lead to overestimates. A calculation of gas reserves should, therefore, be preferably a "running inventory" of proved gas; the estimate should be revised from time to time as more or better data can be used.

Although there are many recent refinements in estimation of gas reserves, more study is needed upon characteristics of gas-reservoir rocks, liquid conditions in reservoirs, solubility of gas in and its release from liquids in the reservoir, producing characteristics of wells and changes with time, influence of well spacing on ultimate recovery, probable pressures in the reservoirs at the time of abandonment, compressibility of natural gases, adsorption of gases by reservoir rocks, and effects of vapors from water and other liquids in the reservoir. Secondary results of such a study would be: (1) to clarify the usage of such terms as "reserves", "proved", "recoverable" and "available" which are now applied loosely; (2) to emphasize the necessity of adequate records that could be used in calculating gas reserves, the kind of information needed and the methods for taking and preserving data obtainable only at certain times in the life of a field.

In the past, few areas have suffered at times from shortage of gas, but in general, in spite of the rapid growth of the industry, reserves have been found and proved in advance of urgent necessity for them. Discoveries apparently are keeping well abreast of production.

Estimates of "known" or "proved" natural gas, ranging from 30 to 75 trillion cubic feet, are from 16 to 40 times the 1⅞ trillion cubic feet produced and marketed in 1935, but one should not assume from this that natural gas operations in the United States will cease within the next 40 years. The frequency and magnitude of discoveries are as difficult to predict as trends in consumption, but it is certain that large reserves remain to be discovered and I am sure that few who have given the matter serious thought will disagree with Ley's statement, in 1934, "There are no known geologic reasons why the recent high levels of natural gas production (metered) cannot be maintained for many years."

Heating Plant Installation Methods

● **GEORGE W. ZIMBELMAN, Green Foundry and Furnace Works, Des Moines, Iowa; addressing Mid-West Gas School and Conference, Iowa State College, Ames, Iowa, November, 1936.—(Abstract by G A S).**

ALMOST every home owner recognizes advantages in gas that are not to be found in any other fuel, as it is the cleanest fuel available, and more even temperature can be maintained. Gas completely eliminates the fuel storage problem and the uncertainty of having fuel on hand when it is needed. Gas companies, because of their complete organization, supply a type of quick, twenty-four hour service that is not practical with other fuels. Correct preparation of every heating plant with proper installation of the gas burning equipment, added to these advantages, should result in sales to almost every automatic heating prospect.

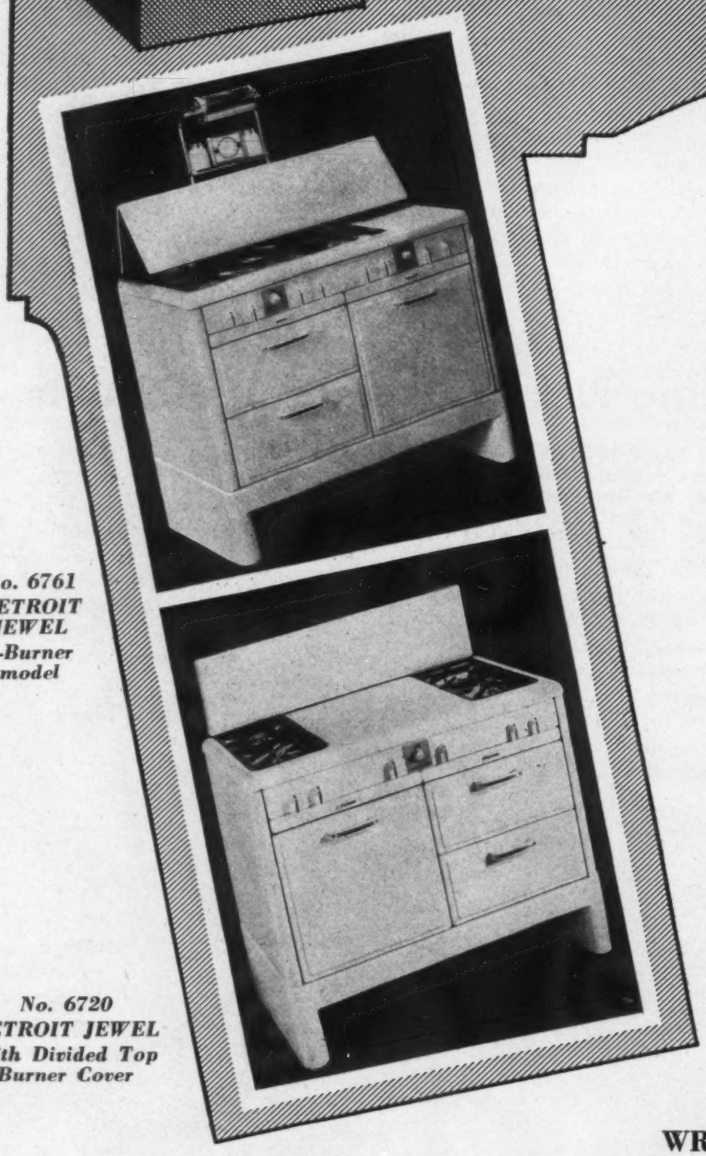
The manufacturers of burners and gas-fired heating equipment has done a good job in the mechanical perfection of his equipment, but the success of this equipment is dependent on installation. With the conversion burner, its location in the boiler or warm air furnace determines to quite an extent the success of the installation. Many hot water boiler burners are located below the return line, allowing the flame to come in direct contact with the mudleg of the boiler. This causes back circulation. The water is heated in the return line, the circulation is slowed down and in some cases almost completely stopped, resulting in excessive stack losses, high basement temperatures, and high fuel bills.

Experience indicates that it is not necessary to raise the burner. In almost every case it is practical to use an insulating fire brick or other insulating refractory around the return line or mudleg of the boiler to keep the direct heat of the burner away from it. This is the best practice, as it gives more head room for combustion and offers additional boiler heating surface.

In the warm air furnace with the conversion burner added, the burner is installed at grate level. On some jobs, however, the return air will enter the furnace casing above the burner level, and the heat of the furnace radiates back into the return air, slowing up or stopping the circulation. Stack tempera-

(Turn to Page 26)

DETROIT JEWEL *Gas Ranges* AGAIN LEAD!



No. 6761 DETROIT JEWEL 6-Burner model

No. 6720 DETROIT JEWEL With Divided Top Burner Cover

Not being content with last year's supremacy or today's leadership . . . and regarding yesterday's progress merely as another forward step toward tomorrow's achievements . . . we present, for your 1937 record-breaking success . . . THE NEW 1937 DETROIT JEWEL and THE NEW 1937 GARLAND Gas Ranges . . . the most beautiful and completely efficient ranges ever produced in our factories.

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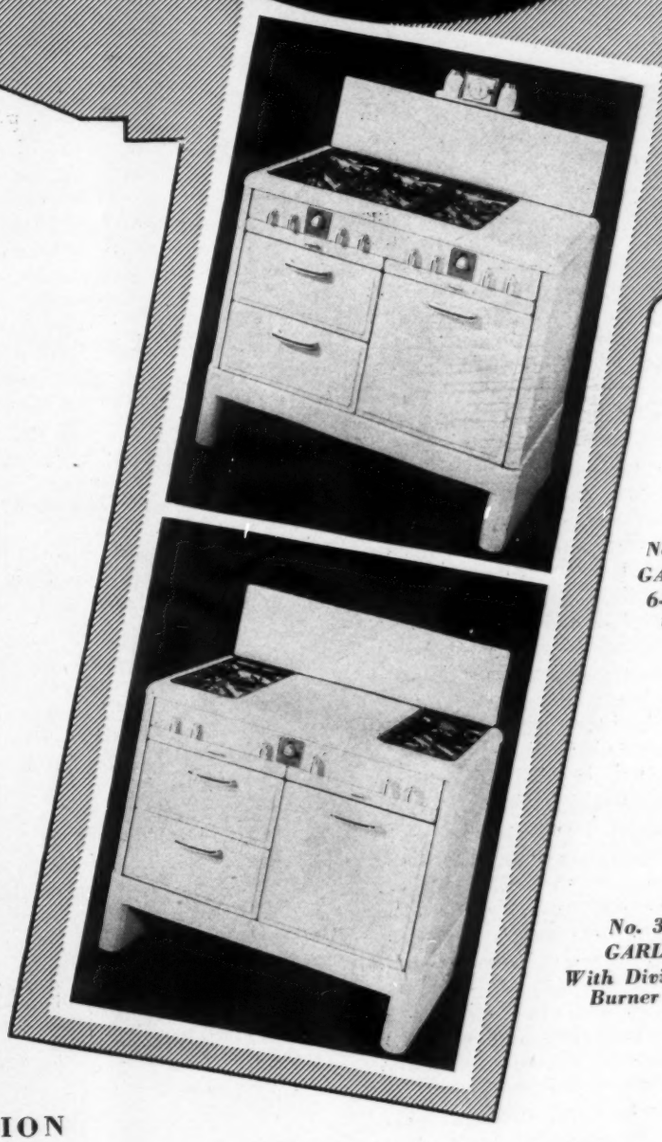
WRITE, PHONE OR WIRE AT ONCE

ERSHIP 1937

GARLAND Gas Ranges

These 1937 Ranges are even more beautiful than last year's beautiful models! Their new designing promotes greater conveniences and greater efficiency! They are improved in performance, in quality and in value. They are the embodiment of silent but powerful salesmanship in every line, in every reason for them being as they are. 1937 will be another great Detroit Jewel and Garland year.



No. 3761 GARLAND 6-Burner model

No. 3720 GARLAND With Divided Top Burner Cover

MICHIGAN CO.

Michigan

FOR COMPLETE INFORMATION

tures go up and basements get hot,—resulting in high fuel bills and a dissatisfied customer.

A practical way to correct this trouble is to install a sheet metal shield about half way between the opening of the return air shoe into the casing, and the furnace. This shield should extend from a point about 4 inches above the return air opening down toward the floor to approximately one-half the depth of the return air shoe, and extend out about 4 inches on either side of the return air shoe opening.

If the installation is correct in every way, the basement temperature should never be higher than the temperature at the thermostat location, as high basement temperatures invariably result in high bill complaints. Dampers have a useful purpose in heating installations. They should be used to make slight adjustments in the distribution of air, but never to cut off 50 or 75 per cent of the leader pipe area. Dampers are an aid to the engineer—not a substitute for engineering.

When it is necessary to close off a large part of the area in several warm air pipes to force heat toward one certain room, the circulation is slowed down. When leader pipes are choked down below their capacity, it is the same as installing smaller pipes and in most cases this means that the total pipe area is reduced below the normal capacity of the heating plant. This refers primarily to gravity installations. When the pipe area is reduced substantially below the normal capacity of the heating plant, the result is high temperatures in the casings and high basement temperatures.

When you plan an installation for an old heating plant, check the job carefully. If you are not qualified by training and experience to determine whether or not the installation meets up-to-date requirements, call in a heating engineer. Or, make a plan and submit it with complete data on the heating plant to a heating engineer in whom you have confidence. Leading furnace manufacturers have trained heating engineers, not only in their office but in the territory as well. They will be glad to cooperate with you in recommending improvements for existing heating plants.

A few common things that often cause trouble, yet in many cases go unnoticed, are: Rugs over air faces; cobwebs in the return air duct, preventing a free circulation of air; fireplace dampers open; seat covers over steam or hot water radiators. These, and many other little things that appear quite innocent, may make an otherwise satisfactory heating plant entirely unsatisfactory.

Perhaps the best way to increase the efficiency of a heating plant is to add a blower. Or, in the case of a boiler, a circulating pump. By properly engineering and installing a blower to an old type gravity furnace, splendid results can be obtained.

As a rule, only a few, simple things need to be done to adapt the gravity warm air heating plant into a very satisfactory forced-air plant. On some jobs, it is only necessary to install a simple hood choke and adjust the air volume with dampers. On others, it may be necessary to do some simple baffling inside the casing, and to reduce the size of the warm air pipes at the furnace. On still others, it may be necessary to put a new hood on the furnace with a plenum chamber. The blower may be placed on either side of the furnace. This usually makes it easy to connect the return air pipes.

Another cause of customer dissatisfaction is lack of humidity. Excessive temperature must be carried for comfort. A few utilities insist on some sort of humidifier being installed on every job, which installation should be standard practice as it can be made at slight cost.

Controls for Heavy Type Boilers

L. S. REGAN, Webster Engineering Co., Tulsa, Okla., addressing the Industrial Gas Section of the American Gas Association at the Eighteenth Annual Convention, Atlantic City, N. J., October 26-30, 1936, being a portion of a paper entitled "Combustion Controls of Gas Fired Boilers—Their Importance to Users and Utilities." (Abstract by G A S).

THE simplest form of automatic controls which has been generally used in the past, is shown in Fig. 1. It is of the full floating or modulating type and to be used with the multiple jet type of burner. When the stack is equipped with a draft regulator fairly satisfactory results are obtained. From experience and observation the best average CO_2 obtained is approximately 7 per cent. Care must be taken not to set maximum too high to prevent CO under extremely low draft conditions. When this type of control is used without the draft regulator the average CO_2 will be lower than with draft regulator and maximum CO_2 must be set lower to prevent CO depending on draft conditions.

Much better operating conditions and efficiency will be obtained with full on and full off control due to the fact that when burner is on it is operating at its maximum CO_2 for which it is set and when off the louvres are closed holding the heat in the boiler.

Fig. 2 illustrates a typical full on and full off control using the slow opening valve. This control can be used with either the multiple jet type burner or the vertical Venturi type. When used in conjunction with the draft regulator the CO_2 may be carried to between 9 and 9.5 per cent without danger of CO depending on draft conditions and if the burner is properly sized and installed.

There are times when extremely high efficiency is desired under very bad draft changing conditions, which cannot be entirely compensated for by the draft regulator. A control of close precision must be used. Fig. 3 illustrates a control of this type. The operation is as follows: Pressuretrol "A" calls for steam closing contracts in magnetic valve "O" raising piston "P" relieving pressure on top of diaphragm "I" through orifice "Q" and line "R" which allows pressure under diaphragm "I" to start valve "S" opening. This valve will continue to open as long as air vane "J" keeps orifice "G" open. When limit of draft is reached

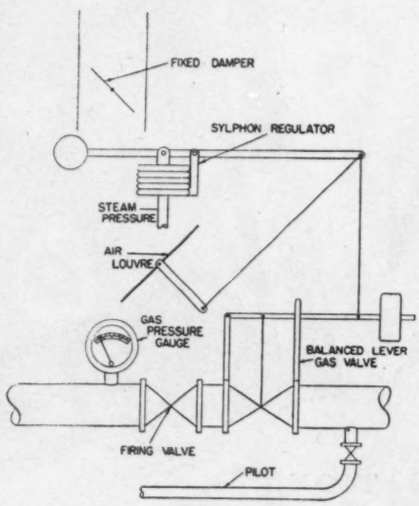


FIG. 1.

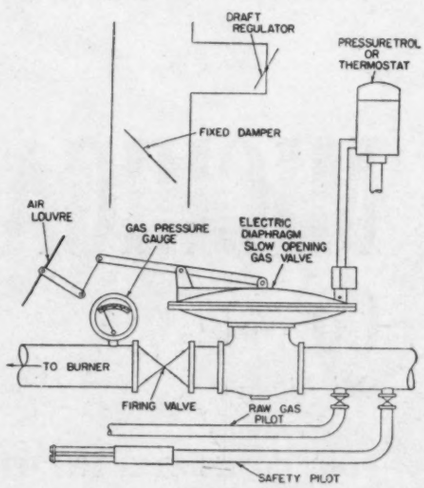


FIG. 2.

air vane "G" drops back closing orifice "G" building up pressure through line "R" through orifice "Q" to top of diaphragm "I" balancing pressure on both sides of diaphragm "I" causing valve to

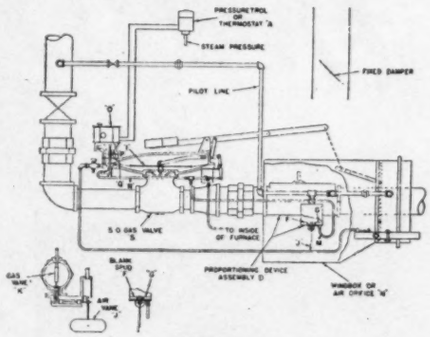


FIG. 3.

be held in position until such time as there is a change in draft conditions or the pressuretrol "A" calls for shut off at which time pressure is built up on top of diaphragm "I" by piston "P" closing line "R" and opening orifice "Q" to gas supply. This pressure with the weight of valve will cause valve to close.

In the case of a cold boiler, air vane "J" will only permit valve "S" to open far enough to flow the amount of gas for the available air. As the temperature in the furnace increases draft, air vane "J" will pull forward permitting valve "S" to open gradually until maximum flow is reached. This feature will prevent the customary vibration encountered in the mornings when starting cold heating boilers.

This control will compensate for barometric and wind changes and gas pressure changes.

CO_2 as high as 10 per cent may be carried on heating boilers without danger of CO providing burners are properly sized and installed.

■ ■

Walton Forstall Resigns In Philadelphia

WALTON Forstall, vice-president in charge of distribution of The Philadelphia Gas Works Co., Philadelphia, Pa., resigned his office on October 31, according to an announcement from Conrad N. Lauer, president of the company. H. B. Anderson, distribution engineer, this month assumed charge of the distribution department. By further executive action, H. D. Lehman was appointed manager of the customers' service department. Mr. Lehman was formerly superintendent of the customers' service division.

Mr. Forstall was the company's senior executive in point of service, becoming affiliated with the Philadelphia gas works as assistant engineer of distribution in February, 1898. It has been largely under his direction that the company has developed its underground mains and services during the past 35 years.

GREATEST Free COOKERY MATINEE
EVER HELD ON THE PACIFIC COAST!
★ Salvatore Santoella and His Twenty-Five Piece Lucca Recording Orchestra!
★ Palomar's Phil Harris in Show-Stopping Songs!
And—the following GREAT Lucca artists in a program of breath-taking quality and thrilling variety:
It's All Free! And So Are the Following Prizes, to Be Distributed at the Modern School of Gas Cookery...
Don't Miss the Fourth and Last October...
EXAMINER-PRUDENCE PENNY Modern School of Gas Cookery
TUESDAY, OCTOBER 27th, at 1 P.M. at the
PALOMAR
ADMISSION FREE

▲

Sample of advertising carried in The Sunday Examiner to promote the cooking school Southern California area.

▼

Cooking Schools Attract 40,000 House

(Continued from Page 12)

able to accommodate the large crowds.

As far as the cooperating department stores were concerned, the cooking school did everything that was expected of it. It carried the message of gas and gas appliances to thousands of Southern California women over a widespread area, and definite sales results following the cooking school were evidenced all over the Southern California area, not only in the sales records of the large cooperating stores, but also in those of many smaller dealers conducting retail outlets in suburban districts.

From the standpoint of the Los Angeles Gas & Electric Corp., the purpose of the school was two-fold: first, it was promoted to tell the story of gas and gas appliances; second, it was an additional promotion attraction offered in conjunction with the "Clock-controlled Range Campaign", currently and jointly sponsored by the three local gas companies, the Los Angeles Gas & Electric Corp., the Southern California Gas Co., and the Southern Counties Gas Co. The range campaign which ran from September 21 to November 25 offered a $30 clock free with the purchase of each clock-controlled range valued at a net minimum of $98.55. To date incomplete figures list approximately 10,000 clock-controlled ranges sold during the campaign.

To summarize results, the school proved a decided sales boost not only to the cooperating department stores but to appliance dealers all over the gas area, it offered a boost to the three companies "Clock-Controlled Range Campaign", but most of all it carried a practical story on the use of gas and gas appliances into thousands of Southern California homes.

■ ■

Halloran Named Sales Advisor For Albany Company

Thomas W. Halloran has been appointed gas sales advisor of the New York Power and Light Corp., Albany, New York, according to R. P. Wagner, commercial manager for the corporation. Mr. Halloran, whose jurisdiction extends over the company's entire territory, will co-operate with all gas districts in promoting the use of gas for industrial, commercial, and domestic purposes. He will headquarter in Albany.

Mr. Halloran first became affiliated with the New York Power company in 1929 as supervisor of gas heating and air conditioning sales.

YOU CAN SEE that this new 1937 Servel Electrolux is the "tops" in beauty! And when you open the door, you'll appreciate *all* that has been done to make it an even greater gas refrigerator than the ones that have been winning so many loyal friends during the past ten years!

It's roomier, with increased storage capacity in every model! It has extra ice cube capacity—more cubes for every size! And it's equipped with a wealth of time- and labor-saving features that every woman will love!

And improvements have not stopped there! We've made this new gas refrigerator *more* efficient—something even *we* didn't believe possible! Owners will be delighted with its still *lower* operating cost, as well as with its famous silence and freedom from moving, wearing parts.

We believe you'll agree that here is the finest gas refrigerator ever built—and that it will mean *more sales* for you this Christmas!

THE FINEST EVER BUILT!

New Sparkling Beauty
Smartly Restyled Interior
Attractive New Hardware
Every Modern Convenience
Greater Ice Cube Capacity
Improved Efficiency
Increased Storage Capacity
Even Lower Operating Cost
Permanent Silence
No Moving Parts to Wear

1937

SERVEL ELECTROLUX READY NOW FOR Christmas Sales

Here's how to make the most of it in your holiday selling

NOT FOR YEARS has Christmas held such promise for gas refrigeration sales! This season, people of every class have more money to spend—thanks to pay increases, special bonuses, extra dividends. They're in a spending *mood*, too. And the opportunity of getting a new 1937 model gas refrigerator in time for the holidays provides a strong, *added* incentive to purchase their Servel Electrolux *now!*

That's why it will pay you to give wholehearted support to gas refrigeration activity during the coming weeks—to spread the welcome news of "Next Year's *Finest* Refrigerator Ready Now" throughout your community—to plan an intensive follow-up of your entire prospect list—and to take advantage of national Christmas advertising on Servel Electrolux by making fullest use of the following tie-in material, which will be available to you shortly—

1. **GIANT NATIONAL CHRISTMAS ADVERTISEMENT** for display purposes. This same four-color advertisement will appear in The Saturday Evening Post, December 12; Good Housekeeping, December.
2. **CHRISTMAS POSTER FOR OUTDOOR DISPLAY**—a striking poster, with the theme "Silent as Night."
3. **ATTRACTIVE HOLIDAY WINDOW DISPLAY** that will invite passers-by into your showroom.
4. **NEW 1937 SERVEL ELECTROLUX CATALOG FOLDER,** full of essential information about "next" year's *finest* refrigerator.
5. **DRAMATIC ADVERTISEMENTS FOR YOUR LOCAL PAPERS** to direct fond husbands and wives to your showroom this Christmas.

This material has been specially prepared to help you do an outstanding sales job this Christmas season. For assistance in working out your holiday gas refrigeration plans, write, wire or phone to Servel, Inc., Servel Electrolux Sales Division, Evansville, Ind.

SERVEL ELECTROLUX

THE *Gas* REFRIGERATOR

Analyzing the Domestic Market

(Continued from Page 10)

shows the average number of therms per room for each size of home. These figures were obtained by dividing the average therms per bill as shown in Table No. 4 by the number of rooms per home. It is evident from this table that, over the range which includes the vast majority of the homes, the average therms per bill are directly proportional to the number of rooms per home, and the conclusion must be made that the consumptions in general are more than roughly proportional to the number of rooms per home. It is interesting to note, moreover, that as the size of the house increases, the average number of therms per room does not tend to decrease; instead, there is a definite and fairly regular increase (except, of course, in the case of the 1-, 2-, and 3-room dwellings).

It might be well to point out that in securing the data which were analyzed to determine the relationships being discussed, all domestic space-heating customer consumption statistics were eliminated; therefore, the increase in consumption per home as the number of rooms increases is in no way a result of the use of gas for space-heating purposes in the larger homes, excepting, of course, the incidental use of gas logs and similar appliances. Even in smaller homes, however, the gas range is used for space-heating purposes on cold mornings; therefore, the element of space-heating is present in some degree in each home-size group.

This information regarding variation in consumption with size and type of home provides a definite basis for designing suitable rates for domestic gas service. The gas industry has made extensive use of the block type rate for domestic gas service. This is commendable from the standpoint of simplicity, but in too many instances the block rate is completely devoid of all promotional characteristics. The straight meter rate is an example of the utmost in simplicity in meter rates, yet it is unpromotional. There is no extra incentive to the customer to use the thirty-first unit after he has used the thirtieth. The block rate, unless carefully designed, takes on the characteristics of the straight meter rate. If the initial blocks are too broad, or if the gradation in price from one block to the next is very small, the rate is, in effect, and particularly as far as the small user is concerned, a straight meter rate. Moreover, even when carefully designed, the block rate is truly promotional where there is little variation in consumption between customers.

It appears that the variations in consumption which have been revealed, are evidence that a type of rate more promotional than most block rates must be adopted by the gas utility if it is to successfully exploit such potential markets as, for example, the domestic water-heating market. What is needed is a promotional type rate based on a recognition of the presence of basic consumption differences within a particular class of customers. However, the determination of the best type of rate for domestic gas service does not fall within the scope of this discussion. Instead, the purpose is to point out that the basic consumption differences which justify the use of a rate more promotional than the ordinary block rate do exist in the case of the use of gas for domestic purposes.

■ ■

Panhandle Eastern To Spend $20,000,000 in 1937

PANHANDLE Eastern Pipe Line Co. is planning the expenditure of $20,000,000 or more for the expansion of its facilities in and from the Texas Panhandle to Detroit, Mich., during 1937, according to an announcement made in New York by J. D. Creveling, president of the pipe line company.

J. D. CREVELING

The major project will consist of additional pumping stations and loops to the existing 24-, 22-, and 20-inch lines from the Panhandle to Detroit. Smaller portions of the budget will be expended for the extending of delivery point facilities. The main line loops will be constructed in accordance with a projected view of eventually paralleling the entire trunk system.

The building program will double present deliveries of 40,000,000 cubic feet per day to the Detroit City Gas Co. and will accommodate increases to other distributing concerns along the trunk line.

■ ■

G. S. Jones Given High Post In Servel Organization

GEORGE S. JONES, Jr., of Dallas, Tex., has been appointed vice-president and general sales manager of the Servel Electrolux Sales Division of Servel, Inc., manufacturers of Servel Electrolux gas-operated and kerosene-operated refrigerators at Evansville, Ind., according to an announcement last month from Louis Ruthenburg, president of the company. Mr. Jones will have his headquarters at the company's plant in Evansville.

Mr. Jones joined the Servel organization in 1933 as district sales manager at Dallas. In 1935 he was promoted to regional sales manager of the Southwestern region with headquarters at Dallas, a position held until his recent appointment.

Since graduation from the Georgia School of Technology in 1912, Mr. Jones has been affiliated with the General Electric Co., the Dallas Power and Light Co., becoming assistant general manager of that company in 1926, and with the Frigidaire Corp. as contact man for one and a half years, regional manager for three years, and public utility manager for three years. He left Frigidaire to join Servel.

■ ■

Thomas Bradshaw Elected To Hewitt's Post

SUCCEEDING the late Arthur Hewitt, who passed away September 17, Thomas Bradshaw, president of the North American Life Insurance Co., has been elected president of the Consumers Gas Co., Toronto, Canada. Edward J. Tucker, assistant general manager of the company, was appointed general manager, a post also made vacant by the death of Mr. Hewitt.

Mr. Bradshaw has been a director of the Consumers Gas Co. since 1930. For several years he was Finance Commissioner of Toronto, and at the present time is a director of a number of other Canadian companies.

Mr. Tucker first joined the Consumers Co. 26 years ago as a junior clerk, advancing through the various departments to become head of the accounting department. In 1928 he was appointed assistant to the general manager and in 1930 he became assistant general manager. In 1931, upon the death of John Armstrong, he took over the duties of secretary. He is vice-president of the Canadian Gas Association and vice-chairman of the Accounting Section of the American Gas Association.

■ ■

U. S. Bureau Surveys Market For Home Gas Facilities

Issued recently by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce was a 120-page book containing charts and graphs and giving a statistical resumé of the markets for gas and electrical facilities in residences as compiled from an analysis of real property inventories in 64 U. S. cities.

Chapters in the book are devoted to comparative studies of the types of fuels furnishing lighting facilities, cooking facilities, mechanical refrigeration, and water heating in the 64-city cross section. Twenty-one tables are devoted to a comparison of the markets now controlled or potentially available to both gas and electric services.

■ ■

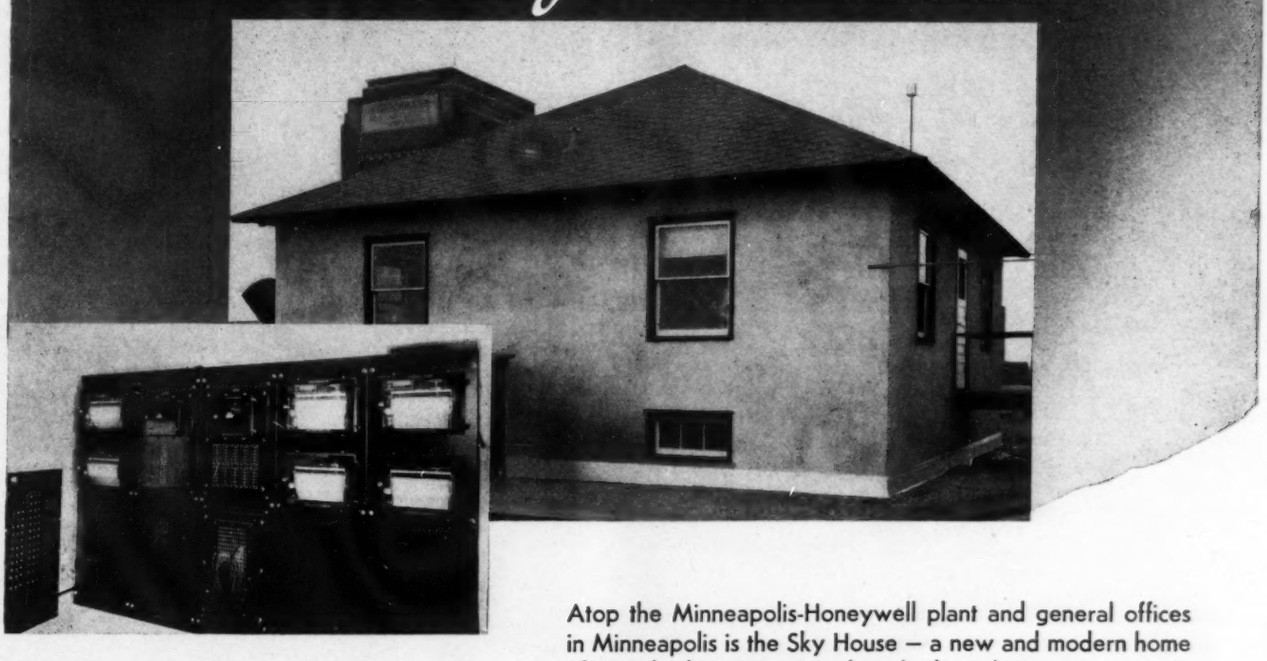
Lone Star to Distribute Health Heating Book

"Don't Give a Cold an Even Break" is the Lone Star System's new booklet on healthful heating, prepared for distribution to customers, through company offices. The booklet is short and concise, with most of the text presented in the form of questions and answers. A number of illustrations are used for the major points in the system's educational effort to teach customers healthful heating habits.

CONSTANT RESEARCH

IN THE MINNEAPOLIS-HONEYWELL

Sky House



The Minneapolis-Honeywell Sky House is equipped with steam, vapor, hot water and warm air heating plants, each system using gas, oil and coal, both stoker fired and hand fired. Deep well water and mechanical cooling and dehumidifying systems are provided. Brown recording instruments keep a record of conditions from 120 different points. Control is available from 80 points, located at four different levels. In the Sky House every kind of heating or air conditioning system, or combination of systems, is available for testing and research for the benefit of the industry we serve.

Atop the Minneapolis-Honeywell plant and general offices in Minneapolis is the Sky House — a new and modern home of standard construction furnished as living quarters. In reality, however, the Sky House is a complete and practical research and testing laboratory. Such research results in a definite contribution to the automatic heating industry and explains why more than a million Minneapolis-Honeywell gas controls alone are in active use today, some of which have seen service for more than 25 years. Minneapolis-Honeywell Regulator Co., 401 East 28th St., Minneapolis. Branch and distributing offices in all principal cities.

Dependable Controls Cost Less Than Service

MINNEAPOLIS-HONEYWELL

Control Systems

BROWN INDUSTRIAL INSTRUMENTS FOR INDICATING, RECORDING AND CONTROLLING

Regional advertising meeting, held at Mayflower Hotel, Washington, D. C., November 19, M. L. Sperry, chairman

Regional Meetings Foster Local Tie-Ins With National Advertising Campaign

By CHARLES PERSON
Director of Publicity, American Gas Association

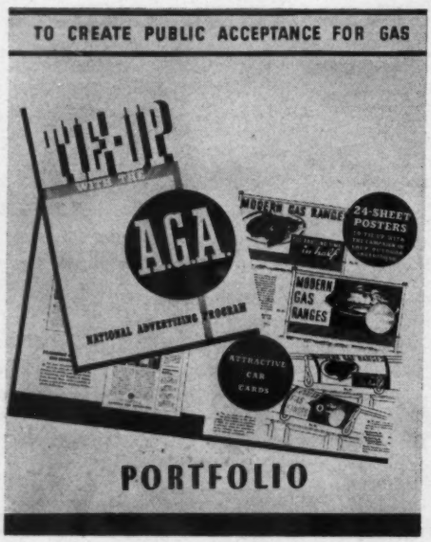
BY the time this appears, representatives of gas companies throughout the country will have attended a series of regional meetings at which a complete story of the Association's National Advertising Program was presented. Plans for these meetings were made several months ago by the Committee to Conduct National Advertising, headed by Major T. J. Strickler, of Kansas City, it being then decided that representatives of various geographical sections serving on the main committee would sponsor the regional meetings. On the Monday following the recent American Gas Association Convention at Atlantic City, Major Strickler met with representatives of McCann-Erickson, Inc., of New York, and meetings, extending from coast to coast, were tentatively set up. Four days later, or on November 6, Herman Russell, of Rochester, N. Y., President of the Association, issued a letter urging support of and local tie-in with the national advertising campaign. The letter carried also a detailed description of the proposed regional meetings and asked the support of gas companies in every section in sending sales executives to the meetings to present ideas, criticisms and suggestions.

Six days following the mailing of this letter the first meeting got under way. In the eastern section meetings were held at Rochester, N. Y., New York City, New Haven, Boston, Philadelphia and Washington. In the central west, southwest and south, meetings were held in Columbus, Ohio, Pittsburgh, Kansas City, Detroit, Chicago, Dallas, Fort Worth, Houston, New Orleans, Atlanta and Memphis. Two additional meetings, to complete the schedule, are now under way, one at Seattle and the other at Los Angeles.

Reports forwarded to Major Strickler by members of his committee, who acted as chairman of the various meetings, stated that attendance was uniformly good, that much interest was manifested in the campaign, and that representatives of gas companies gave detailed reports showing the various ways in which the companies are tying-in their local efforts with the national program.

The sound slide-film describing the program in detail was particularly well received. A number of companies have ordered the film and recording for use before meetings of their employees, dealers and others. In some cases companies held meetings of their department heads immediately following the regional meetings. At these samples of the national advertising material were displayed and talks given on what the industry hopes to accomplish by carrying its story to the gas-using public. Many companies ordered larger quantities of the tie-in material described in the portfolio.

Many requests were made for such additional tie-in material as a complete plate and mat service of black and white advertisements for local newspaper use, calendars,



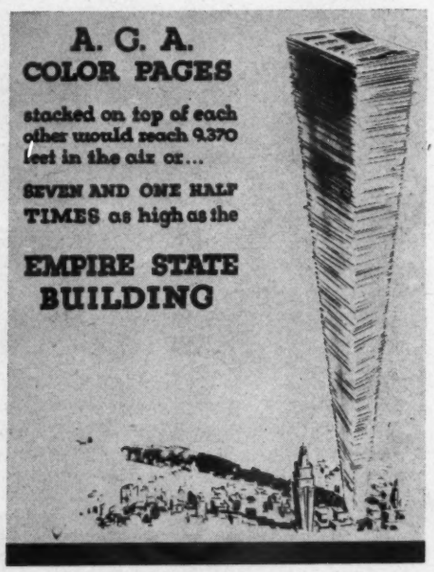
suggestions will come to the attention of the blotters and home service leaflets. These Subcommittee on Approval of Domestic Gas Copy, headed by F. D. Cadwallader of Boston, at that committee's next meeting. Another portfolio containing this suggested new material will probably be put into production at an early date.

The only material offered in the portfolio which has not been ordered in quantities sufficient to assure economical production are the car cards and the posters. The suggested four-page folder describing the program and designed for distribution to employees has been widely used with good effect. The same is true of plates and mats reproducing certain parts of the national ads, the penny folders and the appliance price tags.

It was announced at the meetings that the committee could not make available four-color reprints of the national ads appearing in the women's magazines and the Saturday Evening Post unless orders for these reprints permit of a press run of 100,000 copies to guarantee a price of $8 per thousand reprints.

Some 800 new names have been added to the mailing list to receive the tie-in portfolio and progress bulletins. This tie-in material prepared by the committee for local gas companies is offered to all companies, whether financially supporting the program or not.

A check-up of the meetings shows that sentiment within the industry is greatly improved as a result of the inauguration of the national advertising program. There is a better feeling on the part of both management and personnel as the program reaches


A. G. A.
COLOR PAGES
stacked on top of each other would reach 9,370 feet in the air or...
SEVEN AND ONE HALF TIMES as high as the
EMPIRE STATE BUILDING

its full stride for the first year. News of the program has been spread throughout other industries, as well as into financial and banking circles, with good effect.

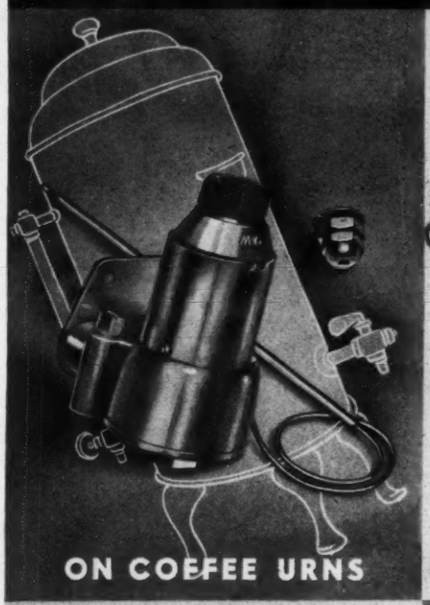
Requests for the booklet "Controlled Cooking" are arriving at Association Headquarters at the rate of 800 a day. As of November 24 about 20,000 booklets had been mailed to readers of magazines in response to written requests. In addition to this circulation several companies have stocked the booklet and are making their own distribution.

ROBERTSHAW

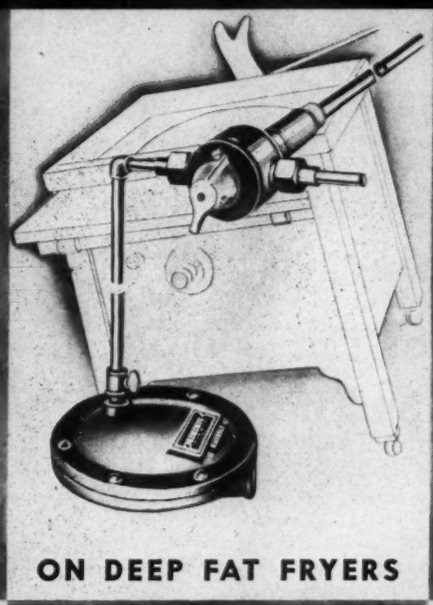
FOR THE MOST DIVERSIFIED LINE OF

AUTOMATIC HEAT CONTROLS

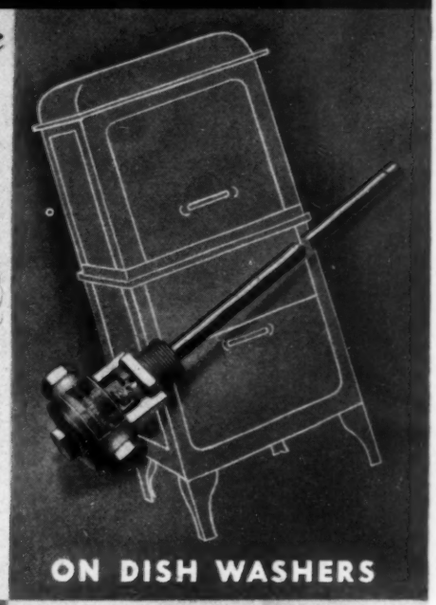
FOR THE KITCHENS OF HOTELS AND RESTAURANTS



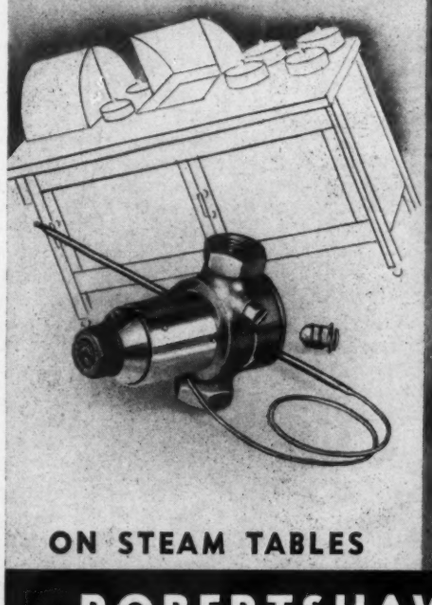
ON COFFEE URNS



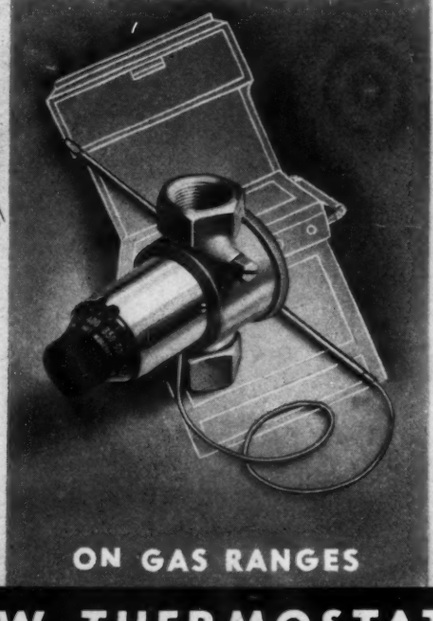
ON DEEP FAT FRYERS



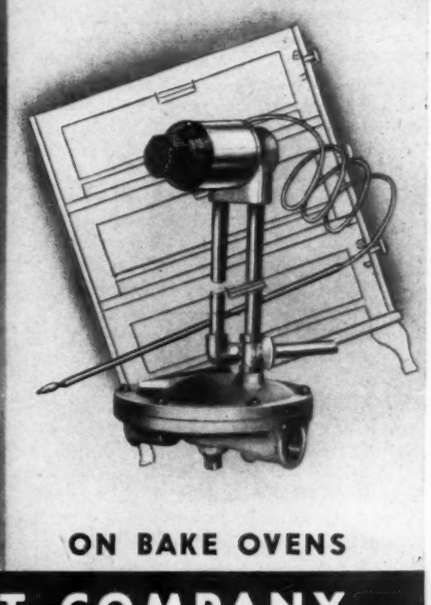
ON DISH WASHERS



ON STEAM TABLES



ON GAS RANGES



ON BAKE OVENS

ROBERTSHAW THERMOSTAT COMPANY

YOUNGWOOD, PENNA.

Manufacturers who have specialized in thermostats since 1899

Laying 12-inch pipe on Peoples Natural Gas Co.'s new line running between Hebron Township and the company's Pew compressor station near Limestone, Clarion County, Pa.

Peoples Natural Gas Co. Completes 105-Mile Pipe Line This Month

THE completion by December 10 of two natural gas transmission pipe lines totaling 105 miles in length and costing $1,500,000 was announced late last month by the Peoples Natural Gas Co. of Pittsburgh, Pa. Contracts for the two projects were let last August to the Williams Bros. Corp., pipe line engineers and contractors of Tulsa, Okla. Construction began September 1.

The course of the major portion of the project, 90-miles of 12-inch line, runs from Hebron Township, Potter County, southwest through Potter, McKean, Elk, Jefferson and Clarion Counties, connecting with the Peoples Gas Co.'s Pew compressor station near Limestone in Clarion County. Rough country was encountered in laying both lines, but the hilly country and lack of roadways on the northern section of the 90-mile project offered the greatest obstacles to both pipe stringing and maneuvering of machinery.

The line, which will normally carry a 400 pounds pressure at the intake end, dropping to 200 pounds at the discharge end at Pew station, will be tested at 500 pounds gas pressure. At this pressure the line will carry gas from the Hebron field into the Pittsburgh area at a rate of approximately 25,000,000 cubic feet every 24 hours. Gate valves will be placed 12 miles apart. Non-rising stem 500-pound flange gates will be coupled to the line with Van Stone flanges.

Strict specifications on the line called for a right-of-way 33 feet wide and a ditch 45 inches deep, with the exception of stream crossings which necessitated a 48-inch cover over the pipe. In solid-rock stream beds the pipe covering is 12 inches thick, while pipe in stream crossings is cemented to six inches on the sides and bottom and to 12-inches on the top. Designed to protect the pipe from ice, drift and washouts, the concrete coating is a mix of 1; 2; 3.

Pipe was furnished by the Aliquippa mill of the Jones & Laughlin Steel Co., being plain, seamless, weighing 39.89 pounds to the foot, with a 3/8-inch wall, and having a mill test of 800 pounds. Average pipe joint length is 40 feet, each joint weighing 1600 pounds.

Ready for the backfill on Peoples Natural Gas Co.'s new 12-inch line.

The pipe was loaded directly from the cars onto seven bolster stringing trucks with trailers which carried seven joints to the load. Much difficulty was encountered by the stringing drivers in maneuvering the lengthy pipe joints around short curves in the territory, and in many cases the pipe had to be dropped some distance from the line, and snaked into position by tow tractors. During the construction, approximately two miles of pipe was strung a day.

In ditching for the project, it was found that the lower 18 inches of the 45-inch depth required was for the most part solid rock, making heavy work for the ditching machine. On hill tops where rim rock approached the surface, it was found that the ditching machine was insufficient, and these stretches had to be first dynamited, and then cleaned out by a small gasoline shovel and hand labor.

Along the right-of-way ahead of the ditcher a sketchy roadway was cleared for the ditcher. In rough and uneven places this trail was made by a small Gasdene shovel, where side slopes or tree stumps were encountered, a 60 horsepower bulldozer was used. The ditchers were powered with 100 horsepower gasoline engines operating both the tractor and the digging wheel. Between 2500 and 6000 feet of ditch was covered in a 24-hour period.

Dresser couplings were used in laying the line, which was set down on an average of a mile a day. The laying gang was slowed up considerably by the number of bends encountered, as many as 21 bends being made in a single day. Sag and overbends were made by driving a tractor over the pipe.

At all improved road and railroad crossings the main line was cased in either 20- or 30-inch pipe. The 30-inch casing was used in rock crossings as the pipe size enabled the hole to be cleaned out by hand labor. On one particular railroad crossing it was necessary to tunnel 73 feet under two main tracks, casing the main line in 73 feet of 20-inch pipe and portions of this being in turn cased in 31 feet of 30-inch pipe, thus giving the railroad the protection of three separate pipes.

Machinery used included two ditching machines, four 60 horsepower boom tractors, four 35 horsepower tow tractors, two backfill machines, one 60 horsepower bulldozer, one four-horse scraper, four pneumatic air compressors with air hammers and drills, two 3/8-yard shovels, one gin pole truck for unloading pipe, seven trucks and trailers for stringing, two 3-ton International trucks, several small pickup trucks, and a carload of hand tools.

■ ■

Gas Service Co. Granted Higginsville Franchise

The Gas Service Co., Kansas City, Mo., was granted a 20-year franchise to serve natural gas to Higginsville, Mo., by a 3 to 1 vote at an election held in the early part of November. Construction of gas mains for the city's distribution system will begin in the near future and the work will be completed within two or three months. As the company's transmission line passes just north of the Higginsville city limits, gas will be available soon after the completion of the distribution system.

Better load building for your company
Money saved for customers...

"Lovekin" Automatic Storage Gas Water Heater—New Series 10, with tank of welded Everdur Metal. Made by Lovekin Water Heater Company, Philadelphia, Pa.

861:6

ANACONDA
from mine to consumer

When automatic water heaters have tanks of non-rust

EVERDUR METAL

(Strengthened Copper)

Tanks of sturdy, non-rust Everdur Metal will do just that, because . .

From the standpoint of your company—heaters equipped with Everdur Metal tanks provide steadier gas consumption. Rust... and rust-repairs, or replacements... can never interfere with their efficient operation. And...at the same time . . . you are saved many a profitless service call. For these very same reasons—you can offer more attractive, longer-term payment plans.

And your customers get—the convenience of clean, *rust-free* hot water indefinitely. Freedom from the expense of repairs and replacements due to tank rust. Long, dependable, money-saving service which they *cannot* get from tanks made of rustable metal.

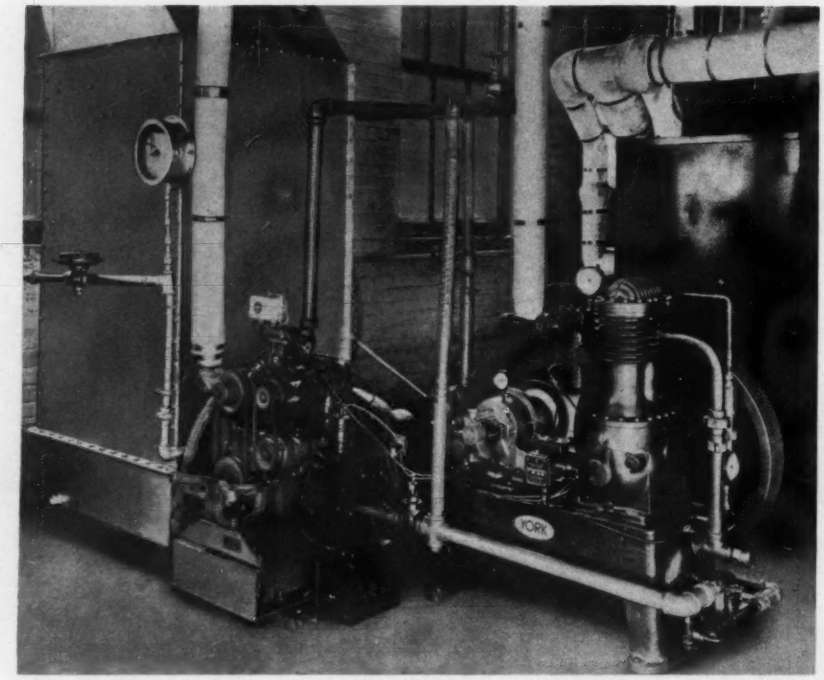
Everdur is nearly all copper... scientifically alloyed with silicon and other elements to provide the strength and "weldability" of steel. Because of its ruggedness... and immunity to rust...leading makers of automatic gas water heaters now standardize on tanks of Everdur Metal for rust-proof models.

"EVERDUR" is a registered trade-mark, identifying products of The American Brass Company made from alloys of copper, silicon and other elements.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities

EVERDUR METAL FOR TANKS

A COPPER ALLOY WITH THE STRENGTH OF STEEL



Gas Engine used to operate Atlanta Gas Light's Air Conditioning System installed to test operating costs

Gas Engine Operates Air Conditioning Machinery for Atlanta Gas Light Co.

TO test the feasibility of operating an air conditioning system with natural gas and to develop the operating costs of such a system, the Atlanta Gas Light Co., Atlanta, Ga., last summer commissioned the York Ice Machinery Corp. to install an air conditioning system operated by a gas engine for the president's office, two other private offices, and a reception room.

The installation was placed in service on July 3, and a meter reading taken on October 5 showed a consumption of 55,000 cubic feet of natural gas, according to E. P. Kramer, industrial engineer of the Atlanta Gas Light Company in charge of the installation.

Mr. Kramer estimates that the compressor engine was operated 430 hours during this period, stating that this figure is higher than normal, because the system was operated longer than regular office hours, and also because offices were used during the extremely hot weather of last summer.

The system includes a York model 444-FW Freon-12 condensing unit, complete as usually furnished but without motor, a model C-608 unit air conditioner with decorative casing, a forced draft cooling tower, and a condenser water pump. The cooling water serves both the condensing and the gas engine.

The compressor is driven by a Continental Red Seal automatic gas engine operating on gas supplied by the company. Speed of the engine, 1000 r.p.m., is reduced by suitable pulley sizes to drive the compressor at approximately its standard speed.

A separate belt from the engine drives the fan of the forced draft cooling tower, and the condensing water pump which was installed on the compressor base in place of the usual electric motor as shown in the above photograph.

Operation of the system is entirely automatic. A high and a low temperature thermostat, and a humidistat, control the starting and stopping of the gas engine by means of a six volt control circuit. This circuit takes its energy from the engine's storage battery.

The only parts of the system which required attention during the summer were the storage battery and the lubricating system on the gas engine. The generator has been set at a sufficiently low charging rate to maintain a constant charge and eliminate the need for adding water to the battery.

Plans are being made to provide an extra two quarts of lubricating oil in the automatic feeder on the engine, so that next season the air conditioning system will operate without any attention whatsoever.

To attain quiet operation, a small amount of insulation was placed between the engine base and the slide rail, and an insulating wall and ceiling installed. The compressor itself was not insulated. The equipment is installed on the basement sales floor, but no operating sounds disturb the sales areas.

■ ■

Franchise Granted

United Gas Public Service Co. was last month awarded a franchise to serve natural gas in the city of Marshall, Harrison County, Texas.

L. A. G. & E. To Sell Electric Properties to City

LOS ANGELES voters at a special election December 8 granted the passage of a charter amendment which will culminate litigation and negotiations of several years standing, by granting the city an option, expiring September 30, 1939, to purchase the electric properties of the Los Angeles Gas & Electric Corp. for the sum of $46,340,000.

Under the terms of the charter amendment a 35-year franchise to supply gas for heat and power within the city boundaries was granted the three local gas distributing companies, the Los Angeles Gas & Electric Corp., the Southern California Gas Co., and the Southern Counties Gas Co. A sum of $505,000 was set by the city as the amount to be paid by the three companies for prior use of the city streets.

The Municipal Bureau of Power and Light, Department of Water and Power will purchase the properties from proceeds derived from the sale of revenue bonds in the amount of $46,340,000. The Los Angeles Gas & Electric Corp. will utilize $42,000,000 of this money to retire outstanding bonds.

The sale of the electric properties involved will mean that the activities of all three local companies will be restricted to the sale of gas, and it is understood that this fact will result in an extensive load building campaign throughout a territory served by almost 800,000 active meters.

■ ■

Franck Made Sales Manager of Grand Rapids Co.

BERNARD T. Franck was appointed sales manager of the Grand Rapids Gas Light Company, effective November 1. He was formerly Coordinator of Sales for the American Light & Traction Company of Chicago, with which the Grand Rapids company is affiliated. Mr. Franck has been acting sales manager of Grand Rapids Gas Light since the time that natural gas was received in the city. L. H. Verschoor is assistant sales manager of the company.

B. T. FRANCK

■ ■

Clarke and Gosling Resign Laclede Gas Co. Posts

Harley L. Clarke, chairman, and Edward P. Gosling, president, have resigned from their positions with the Laclede Gas Light Co., St. Louis, Mo., according to press dispatches. Mr. Clarke has also resigned as president of Utilities Power and Light Corp., Chicago, of which the Laclede Gas Light Co. is a subsidiary.

■ ■

Franchise Purchased

A 25-year franchise to supply gas to Yuma and Washington counties, Colo., has been purchased from the Rapid Natural Gas Co., Cedar Rapids, Ia., by Frank Andrews, Akron, Colo., according to recent news dispatches.

HERE'S HOW TO SAFEGUARD THE CONVENIENCE OF GAS HEATING!

J-M Transite Flue Pipe is installed quickly, economically and easily. There is a complete line of fittings suitable for every kind of job.

J-M Transite Flue Pipe . . . highly corrosion-resistant, weatherproof . . . solves venting problems permanently and inexpensively

IN selling gas for domestic heating, convenience is one of your strongest appeals. But, as every gas-company sales manager knows, trouble with the equipment or venting system can quickly nullify, in the customer's mind, all the inherent advantages of gas itself as fuel.

Because this is so, more and more gas companies are adopting Johns-Manville Transite Flue Pipe as their standard venting system. Quickly and economically installed, Transite Flue Pipe, an asbestos-cement product of tested durability, offers the maximum assurance of permanent, dependable performance, free from maintenance and worry.

INSTALL IT . . . FORGET IT! Transite is remarkably resistant to corrosive fumes and immune to weather conditions. It ends the need of repairing and replacing corroded flue pipes and chimney linings.

Furthermore, its relatively low heat conductivity keeps stack temperatures at a high level for longer distances and minimizes condensation in the flue. Like all asbestos products, it is exceptionally resistant to high temperatures. On either outdoor or indoor jobs, you can install it and forget it.

Transite Flue Pipe comes in both round and oval form, in various capacities and with a full line of fittings. Cost, considering its obvious superiority, is surprisingly low.

It is approved by the National Board of Fire Underwriters!

Send the coupon now for the new Transite Flue Pipe manual. You'll find specifications and complete information in regard to installation methods, including the use of Transite for chimney linings.

ABSOLUTELY WEATHERPROOF

Outdoors . . as well as indoors . . Transite has solved venting problems in thousands of homes. Made of asbestos and cement, this flue pipe remains unaffected by weather throughout its long years of service.

SEND FOR THIS BOOK TODAY!

Here is J-M's new, comprehensive flue-pipe manual! It tells how Transite's asbestos-cement composition assures the permanent solution of your venting problems. It contains detailed drawings on every type of installation, plus complete tables on sizes, weights and prices of all fittings. Sent free and without obligation.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

TRANSITE FLUE PIPE

JOHNS-MANVILLE, 22 East 40th Street, New York City
Send me your new 20-page manual on Transite Flue Pipe.

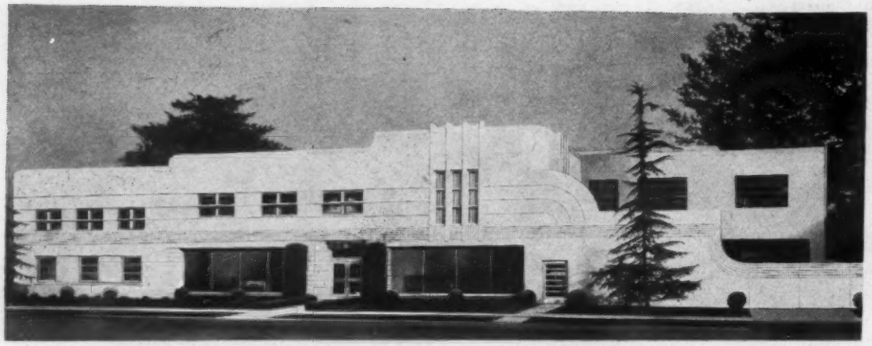
Name_____

Organization_____

Address_____

City_____ State_____

G-12-36



A masterpiece in modern architecture are the new offices and factory of the Payne Furnace & Supply Co. in Beverly Hills, Calif.

Payne Furnace Modernizes Factory

PAYNE Furnace & Supply Co., Beverly Hills, Calif., culminated expansion activities covering a 20-year period with the opening of its new ultra-modern plant November 19. Several hundred people visited the plant during the housewarming. Features of the new structure are speed and efficiency of production and improved working conditions for employees.

Various models of furnaces and appliances manufactured by the company are installed in the display room on the first floor of the main building for the benefit of architects, retailers, and visiting gas company representatives. Some of these are operating displays in natural settings. A winter air conditioner, installed as an operating display, is used for air conditioning.

On the second floor are offices and an auditorium seating approximately 200 persons. The auditorium will be used for sales conferences and for the home service department to be conducted by Gladys Price under the auspices of the Southern California Gas Co. The first cooking class is scheduled for December 9. Demonstration equipment in the auditorium's model kitchen is all-gas.

Much new equipment has been placed in the factory. Opening-day visitors evinced much interest in the assembling departments for each type of equipment and in the finishing department, where finished models are enameled preparatory to the baking process, according to company officials. In the finishing process the graining of casings and grilles for floor furnaces is done by rolls etched from impressions gained through photographs of wood grains.

The plant includes a laboratory for the rigid testing of all products before submission to the American Gas Association Testing Laboratories for approval.

■ ■

E. L. Rawlins Leaves Bureau To Join United Gas

EDWIN L. RAWLINS, since 1923 petroleum engineer of the United States Bureau of Mines at Bartlesville, Okla., has been appointed superintendent of the production engineering department of the United Gas Public Service Co. Mr. Rawlins' headquarters and his home have been established in Houston, Texas, where the general offices of the company are located. His duties will consist primarily of petroleum and natural gas engineering.

E. L. RAWLINS

Mr. Rawlins, a native of Garrett, Texas, is 35 years old. He is a graduate of the University of Texas, class of 1922, in mechanical engineering.

Following graduation, Mr. Rawlins was employed for a year before his appointment to the Bureau of Mines as junior engineer for the Empire companies at Bartlesville. During his association with the Bureau he conducted research and field investigations on petroleum and natural gas problems. In his natural gas studies, Mr. Rawlins maintained close contact with the technical and research committee of the Natural Gas Department, American Gas Association. At the termination of his service with the Bureau of Mines, he was senior petroleum engineer in charge of all oil and natural gas production research at the Bartlesville station of the Bureau.

Mr. Rawlins is author of several Bureau of Mines publications dealing with oil and natural gas production, and natural gas transmission.

■ ■

Gas Service Co. Sales and Rentals Best Since 1730

With gross appliance sales and the value of rented equipment in October reaching total of $425,963.23 on an installed basis, the new business departments of the Gas Service Co., Kansas City, Mo., enjoyed the best business of any month since October, 1930. According to company officials, more than 500,000,000 cubic feet was added to the company's estimated annual load.

During the month gas appliance sales amounted to $234,396, while the value of equipment rented was $191,566. Sales and rentals during the week of October 25 reached $78,485. During the month there were sold and rented 2,229 large size space heaters, 309 furnaces and boilers, 576 conversion burners, 862 radiant type heaters, 682 ranges, 321 automatic storage water heaters, 156 unit heaters, 4 incinerators, and 220 miscellaneous appliances. Total appliances sold or rented numbered 5,359.

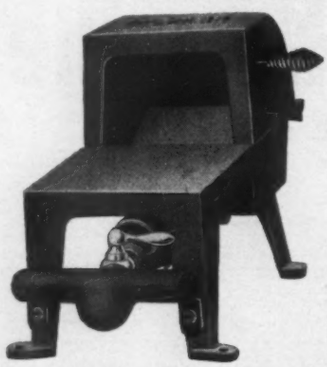
HUMPHREY AMBASSADORS

THESE beautiful cabinet heaters provide efficient, fan-forced gas heat at little cost. Just what your customer needs for that small shop, restaurant or office. Write for further interesting details.

No. 40

GENERAL GAS LIGHT COMPANY
KALAMAZOO, MICHIGAN

JOHNSON 501 SOLDERING FURNACE



An outstanding single burner soldering furnace which is highly efficient, economical to operate and priced remarkably low. Heats soldering coppers up to 6 lbs. per pair. Heat-treating of small parts or metal melting can be successfully done. No forced air blast is required. Johnson Patented curved shaped hood, which is hinged for easy removal, forces a return blast over the tops of irons or parts being heated. Write for full details.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Western Representative:
C. B. BABCOCK CO.
135 Bluxome Street
San Francisco, Calif.

Eastern Representative:
J. H. McPHERSON
250 Stuart Street
Boston, Mass.

IT'S easier TO SELL AN automatic WEDGEWOOD

...with big Holiday Dinners coming up!

WOMEN are thinking of those big holiday dinners they'll have to cook and just *wishing* they could only have a "holiday" in the kitchen instead.

Right there is your big sales opportunity... the chance to show women Wedgewood's many automatic features that make cooking more *carefree.*

There's not a housewife today who would not like the thrill of putting a roast in the oven... setting the automatic time and temperature controls... leaving the kitchen... and coming back to meat that's been gently cooked to mouth-watering tenderness.

That's the way women *want* to cook... they're tired of watching the food every minute... and that's your cue to greater sales before the holidays. Tell your customers about *all* the automatic features of the new Wedgewood.

Model shown: No. 1045 C-T... Closed Top, Table Top Model
No. 1085 O-T... same as 1045 but with open top

WEDGEWOOD'S AUTOMATIC FEATURES THAT MEAN MORE SALES:

- Automatic top burners that light at the turn of a hand... no matches... no bother.
- Automatic oven lighting... no stopping to light burner.
- Automatic oven temperature control... maintains low, even, s-l-o-w heat... without attention. Cooks roasts to tender, juicy goodness... no meat shrinkage... no watching. Saves up to 20 per cent of gas.

WEDGEWOOD *The Modern Gas Range*

MORE THAN A MILLION SATISFIED USERS

JAMES GRAHAM MANUFACTURING COMPANY · San Francisco · Los Angeles · Newark · Portland

Home economics demonstration room of the Citizens Gas and Coke Utility showing a group of girls gathered for instruction in modern gas cookery.

Citizens Gas Offers Public Free Use of Cooking Demonstration Room

INCREASE in the number of sales from the floor has followed the modernization of the showroom and sales offices of the Citizens Gas and Coke Utility, Indianapolis, Ind., according to F. G. Rastenburg, general sales manager. Outstanding feature of the utility's remodeling work was the establishment of a home economics demonstration room.

This room is equipped with twenty modern gas ranges, permanently installed, as well as cooking tables, sinks, a gas refrigerator and miscellaneous cooking equipment. Here the utility's home service division regularly conducts food demonstrations and cooking schools.

The room is available at no cost to local homemakers clubs and groups interested in home economics. Currently several groups of Indianapolis Girl Scouts and Camp Fire Girls are meeting daily in the demonstration room for elementary lessons in modern gas cookery.

The remodeling work included enlargement of the show-windows, installation of a tile floor and modern lighting fixtures and rearrangement of the customers' counters to allow for more floor space.

■ ■

Servel Given P.W.A. Contract For 2,128 Refrigerators

SIGNING of a contract for purchase of 2,128 gas-operated refrigerators for installation in seven of its slum clearance and low-rent housing projects was announced last month by the Public Works Administration.

The contract was made with Servel Inc., of Evansville, Indiana. The Servel Company will furnish the 2,128 refrigerators at a price of $157,470. The contract was awarded on the basis of open bidding on advertised specifications.

The refrigerators will be installed in projects where low gas rates offered the Housing Division by public utilities, make this type of refrigeration the most economical. The projects and the number of refrigerators to be installed in each are as follows:

Location	Name of Project	Quantity
Cambridge, Mass.	New Towne Court	270
Enid, Okla.	Cherokee Terrace	80
Louisville, Ky.	College Court	126
Louisville, Ky.	LaSalle Place	212
Memphis, Tenn.	Dixie Homes	450
Memphis, Tenn.	Lauderdale Courts	636
Oklahoma City, Okla.	Will Rogers Courts	354
	Total	2,128

The refrigerators, which are of standard design and appearance, have a capacity of 4 cubic feet, conforming to those currently offered to the commercial trade.

■ ■

"Carefree Minutes" Radio Series Aids Range Drive

"Carefree Minutes with a Clock Controlled Gas Range" was the title of a radio series broadcast over KHJ and KFI, Los Angeles, Calif., under the sponsorship of the Southern California Gas Co., Southern Counties Gas Co., Los Angeles Gas and Electric Corp., and eleven local appliance dealers. There were nine programs in the series, beginning on October 25 and ending on November 18. The series was offered in conjunction with the "clock controlled range campaign," a current sales activity of the three companies. Popular radio entertainers and motion picture players appeared during the series.

■ ■

Compressor Units Installed

Natural Gas Pipeline Co. of America, Chicago, Ill., has installed additional compressor station units at Beaver County, Okla.; Mineola, Kan., and Harper, Ia. The units, which are 1250 horsepower Worthingtons of the gas engine driven type, were added for the purpose of balancing horsepower requirements at these stations to relieve overload during periods of peak delivery.

NO TRICK TO CLEAN 40 FT. JOINTS OF PIPE "THE NEW IDEAL WAY"

New Ideal De-Lux Model Pipe Cleaning Machine, with Extension Stands for cleaning 40-foot joints of pipe, in use at Independence, Kansas, by the United Gas System. The spring action of the extension stands, actually helps to straighten the pipe.

New Ideal Straighteners and Tri-Pod Hoists, Too

Write for Complete (Illustrated) New Ideal Catalog

KNOWN AROUND THE WORLD

The NEW DEAL SPECIALTY CO.

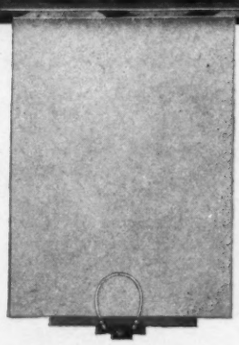
— INC. —

OKMULGEE, OKLA., U.S.A.

Export—Lucey Export Corporation

3505 Woolworth Bldg., New York, N. Y. Broad Street House, London, E. C. 2, England

For Commercial Gas Heating



Payne Floor Furnaces and Modern Console Heaters may be used for complete store heating or as an auxiliary to an outmoded or inadequate central plant. The illustrations are actual installations of Payneheat in New England establishments.

PAYNE

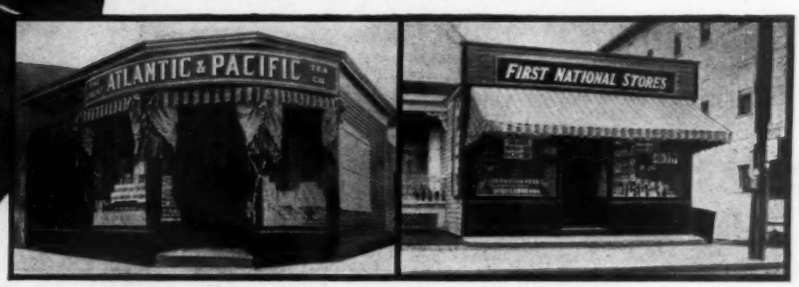
Floor Furnace..Console Heaters

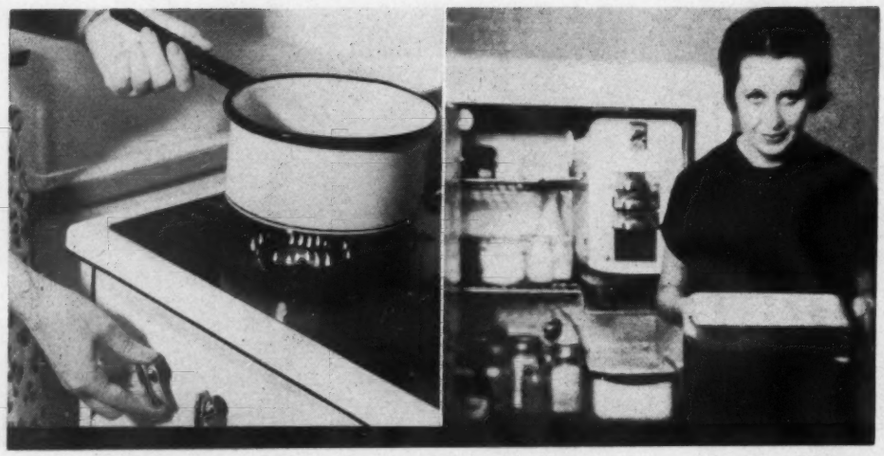
★ Sales of Payne Gas Heating Equipment to Stores, Cafes, Beer Parlors, etc., has a two-fold reaction in gas appliance merchandising: Opens a vast field for profitable heating load and reaches the home market by creating ideal conditions in merchandising centers.

There is an unlimited field for Payne Gas Heating sales in small stores, cafes, beauty and barber shops, haberdasheries and ladies' ready-to-wear establishments. In some cities this market has been entirely overlooked. Payne Floor Furnaces and Modern Console Heaters are especially adaptable to this type of installation, offering the owner or tenant an economical system to install and operate as well as providing his store with clean, even and comfortable heat at all times. Payne Console Heaters are finished in colors to harmonize with any store interior. Completely automatic, Payne Gas Heating will eliminate the losses through spoilage to merchandise caused by uncertain temperatures. Payne products are vented —there is no "sweating" to cause damage to fabrics or clothing. It's healthful heat! The scientific circulation principle eliminates cold spots and creates a beneficial ventilating action throughout the space being heated.

Investigate the possibilities for greater load building through Payne Gas Furnace sales to the commercial trade. Write us for particulars regarding the success of Payneheat in this field.

Payne Furnace & Supply Co.
BEVERLY HILLS • CALIFORNIA





Two domestic utilization shots from Peoples Gas Light and Coke Company's recently completed motion picture, "The Constant Flame."

Peoples Gas Light Motion Pictures Prove Popular with Varied Groups

WITH the recent completion of the film, "The Constant Flame," The Peoples Gas Light and Coke Co., Chicago, Ill., now has available for free showing six motion pictures presenting various phases of the company's service.

"The Constant Flame" is in two reels. It tells the behind-scenes story of the distribution and transmission of gas and the various ways in which gas serves the home. A speaker accompanies the showing of the film, and the company has its own portable projector and equipment.

"The Blue Flame," also in two reels, shows the construction of the world's largest and longest pipe line, the natural gas line from Texas to Chicago. The film has been shown to thousands of Chicagoans at meetings of civic and community organizations. This film, according to statements of the utility company, was so popular that many program chairmen inquired about other instructive motion pictures and this interest led to the filming of the recently completed "Constant Flame."

The Peoples Gas Light and Coke Co. also has for free showing "Gas, the Ideal Fuel." It is a one-reel picture about the production and utilization of gas. It is suitable for audiences interested in technical subjects.

"How Gas Is Made" is a one-reel companion to "Gas, the Ideal Fuel," treating the subject matter from a technical point of view. The two pictures are designed for showing on the same program.

"Artificial Respiration," a one-reel presentation of first-aid methods, has been shown before safety and Boy Scouts groups and medical organizations.

"The Heart of the Home" is a sound motion picture telling the story of modern gas ranges and their importance in the preparation and cooking of wholesome food. This film is of special interest to women's clubs.

The advertising department of the gas company has issued an attractive brochure describing the films and their suitability for community organizations, church and lodge groups, and neighborhood clubs.

■ ■

Three Cities Service Chiefs Inspect Subsidiaries

THREE executives of the Cities Service Co., New York, N. Y., last month completed a country-wide tour of inspection of various subsidiary properties controlled by the company. The officials were W. Alton Jones, first vice-president; Temple W. Tutwiler, newly elected member of the executive committee; and George H. Shaw, special counsel for the company. Cities Service controls utilities in New York, Delaware, Louisiana, Oklahoma, and Missouri.

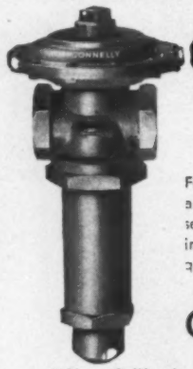
Mr. Tutwiler, whose recent election brings him into active contact with the company's operations in petroleum natural gas and petroleum, visited many of the properties for the first time. He has assumed many of the duties formerly carried by the late Judge H. O. Caster. Long a board member of Cities Service, Mr. Tutwiler was formerly associated with the United States Steel Corp., and was at one time director general of British steel interests in India.

■ ■

Michigan Co. Names Kapp General Manager

M. L. Kapp, for four and a half years supervisor of district management and operations for the Oklahoma Natural Gas Co., Tulsa, Okla., has accepted the position of general manager for the Michigan Public Service Co. He will have charge of the company's properties located in northern Michigan. The company serves 100 cities and towns.

Mr. Kapp joined the Oklahoma Natural Gas Co. in 1920 as a clerk in Chandler, Okla. For three years he served as traveling auditor. For two and a half years he was manager of the Oklahoma City district. In 1932 he was promoted to the position of assistant to the vice-president in charge of operations.



Connelly Pressure Relief Valve

Diaphragm Controlled

Type HPRF

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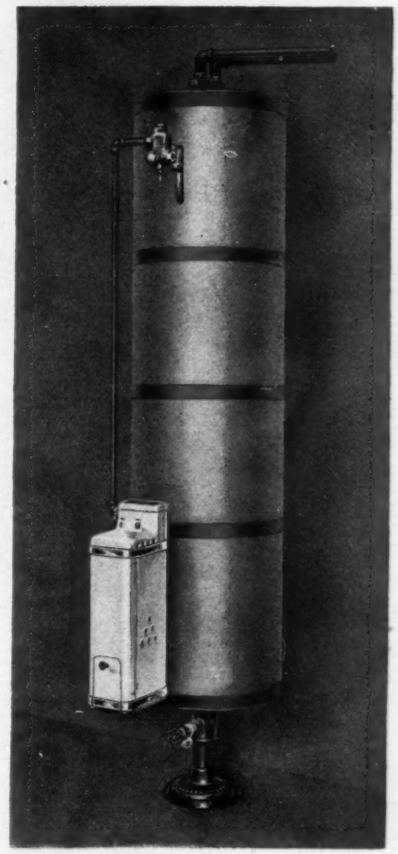

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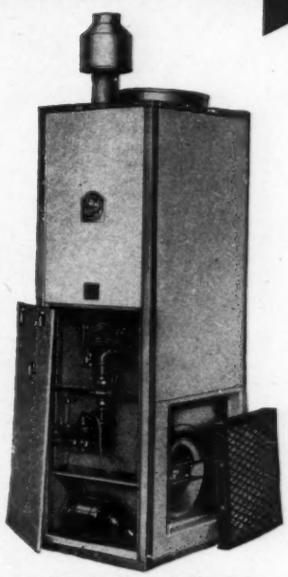

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P. G. B. MORRISS
Manager

United Natural Gas Co. making pipe line crossing ditch in bed of Allegheny River between Oil City and Franklin, Pa., using a Ditcher to excavate gravel and sand.

United Gas Uses Ditcher to Replace Pipe Line Crossing Allegheny River

By J. C. ALBRIGHT
Staff Correspondent

DURING the spring thaw of 1936, one of United Gas Co.'s 8-inch gas transmission lines, which crossed the Allegheny River between Oil City and Franklin, Pa., was punctured in numerous places by the sharp edges of the ice floes, making it imperative to abandon that portion of the line and replace it with a new river crossing. The old crossing had been laid several years previously by utilizing hand labor, shoveling the sand and loose gravel out of the temporary ditch so that the line could be covered by the water washing sand and gravel over the pipe. The pipe was reinforced with the usual river clamps, which were removed so they could be used as the new crossing was being completed.

When the United Gas Co. undertook the job of replacing the damaged river crossing with new pipe, hand labor was replaced so far as possible with a Cleveland Baby Ditcher. Machinery for opening a pipe line ditch has been used for several years in Pennsylvania to excavate pipe line rights-of-way where the soil conditions will permit, but this river crossing was the first to be attempted with equipment other than hand-operated shovels. The point where the old crossing was made is where the river runs as a "riffle," over sand and gravel bars which made it comparatively easy to operate a ditching machine, especially during the dry season when only a small amount of water was flowing down the channel.

The particular machine used by United Gas Co. to lay the pipe line across the river was built with the motor mounted sufficiently high so that the running water of the river did not interfere with the operation of the carburetor or magneto. When excavating the sandy gravel from the deepest part of the river, the tracks of the machine were completely submerged. Material removed from the excavation was thrown down stream so the force of the running water would not immediately fill the ditch. Men operating the equipment and laying the line wore hip boots.

The new crossing was made by using 8-5/8-inch Youngstown grade "A," 1200-pound line test seamless pipe, which was joined together by welding with acetylene.

Backfilling after the river clamps were applied was left to the action of the current of the river, which washed sufficient material over the pipe to cover it. Very little difficulty was experienced on this crossing, as the line was shifted to the ditch immediately behind the machine by men who applied the clamps and followed the machine closely.

■ ■

Symposium Gives Gas Sales And Advertising Data

A symposium on sales and advertising methods by gas executives from companies all over the world is presented to the gas industry in the summer number of *West's Gas*, official publication of West's Gas Improvement Co., Ltd., Manchester, England, and of West Gas Improvement Co. of America, New York. More than 20 companies are represented in the book, which contains 143 pages and many illustrations.

A portion of the book is devoted to phases of gas and coke sales in the United States. Prepared under the direction of Alexander Forward, managing director of the American Gas Association, this section offers contributions from J. P. Haftenkamp, Victor Starzenski, and the late Arthur Hewitt.

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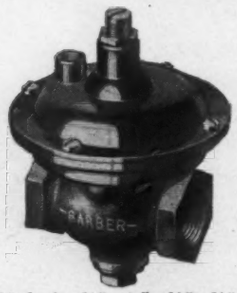

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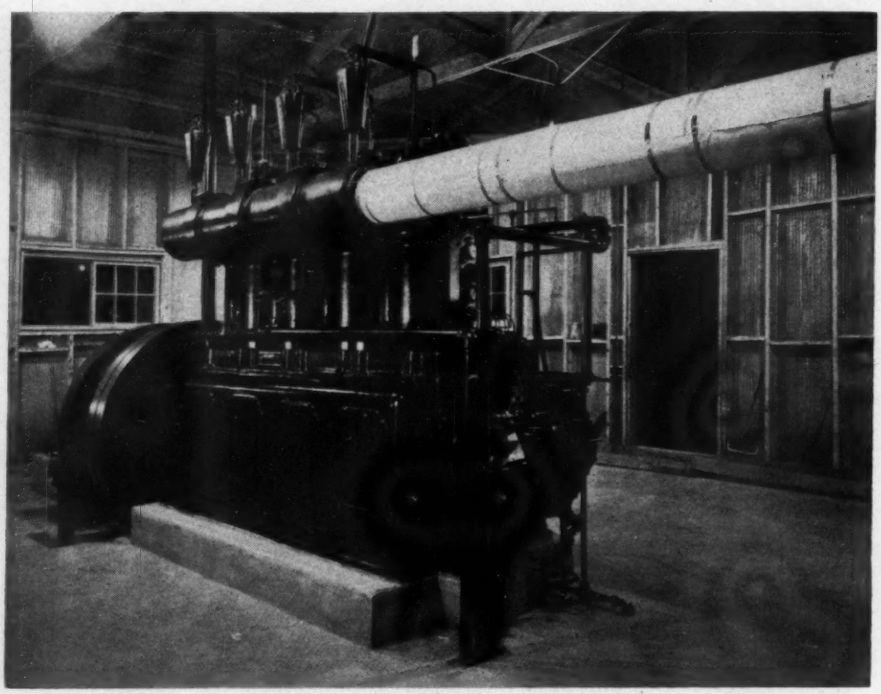


Exhaust-side view of gas engine installed at John Brown School to generate power for radio station, lighting, and pumping.

Gas Engine Will Generate Power for University Radio Station

POWER to operate Station KUOA, "University of the Air" radio voice of John Brown University, Siloam Springs, Ark., will be generated by a 250 horsepower Cooper-Bessemer gas engine, recently installed by the school. Since the University is a completely self-contained community, the new engine has many additional duties. It not only furnishes the school's lighting, and pumps water from four drilled wells and two springs, but also supplies power to operate each of the university's "industries."

The students at John Brown build their own buildings, raise their own food, and make their own clothes and furniture. This "univer-city" has its own bank, printing plant, irrigated farms and gardens, ice plant, laundry, bakery, garage, electric and machine shops. All are operated from the institution's own central power system, and power is even sold to some of the surrounding farms.

The new Cooper-Bessemer gas engine is of the 4-cylinder vertical type. It is rated 250 horsepower at 277 r.p.m., and drives a 175-kw. A. C. generator.

The radio station hopes to operate on a 24-hour schedule. Application has been made for an increase in power from 1,000 to 50,000 watts, so that devotional and educational messages may be transmitted all over the country. No commercial programs or advertising will be carried, the station being supported by the school and by outside donations.

United Engineers Loses Frank Seeber, Superintendent

J. FRANK Seeber, construction superintendent, United Engineers & Constructors Inc., who for the past 34 years has been affiliated with the United Gas Improvement and subsidiary companies, headquartering in Philadelphia, Pa., died October 10 after an illness of more than a year.

Mr. Seeber entered the employ of the United Gas Improvement Co. in 1902 as a foreman in the construction department erecting gas plants and gas plant apparatus. In 1904 he became erecting engineer and held this post until 1928, when he was promoted to the post of construction superintendent for the newly formed United Engineers & Constructors Inc. During his career, Mr. Seeber constructed gas plants in various parts of the United States as well as in Rio de Janeiro and Sao Paula, Brazil.

■ ■

Atlantic City Chosen For 1937 Metal Exposition

The 1937 Metal Congress and Exposition will be held October 18-22, in Atlantic City Auditorium, it was announced last month by W. H. Eisenman, managing director of the annual show and National Secretary of the American Society for Metals, after a meeting of the Society's board of trustees in Cleveland, Ohio. This event has been staged and sponsored by the society for eighteen successive years.

BUTANE-PROPANE NEWS

Imperial Gas and Standard Oil Companies Bottling Plants at Huntington Beach

By ANATOL FOMILYANT
News Editor, G A S

IN Huntington Beach, Calif., the Standard Gasoline Co. has its No. 4 Absorption Plant which strips from casing head gas some 20,000 gallons of gasoline daily. Four fractionating columns at this plant produce propane, butane, iso-butane and ethane.

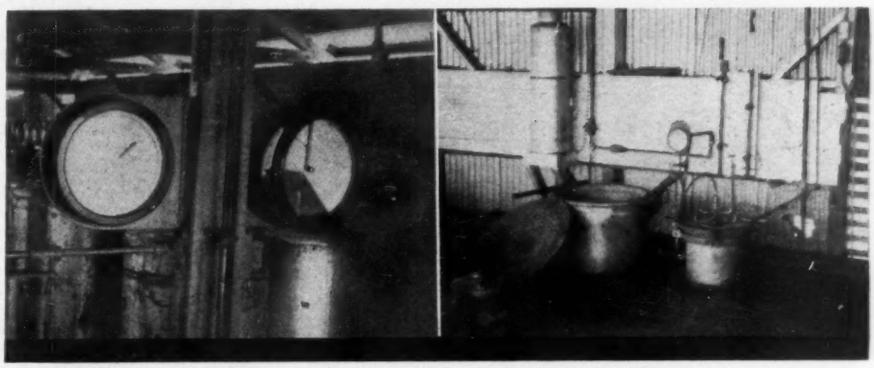
This plant serves the liquefied gases by pipeline to two bottling plants located on adjacent properties. One of these belongs to Standard and the other to the Imperial Gas Co. with headquarters in Los Angeles. These two plants are similar with respect to operation and equipment.

Liquefied gases with normal vapor pressure of 80 pounds are delivered to the bottling plants by steam driven pumps at about 250 pounds pump pressure. The gases are mixed in the desired proportions and odorized with Cal-Odorant for the Imperial Gas Co.'s requirements for its "Rockgas" and its commercial iso-butane product "Heat-Wave," and for Standard's "Flamo," "Calol," and "Bu-Gas" on the absorption plant site. This mixing takes place in tanks connected to the fractionating columns. The gas mixtures are gauged by liquid level in these tanks and 1 per cent is allowed for loss in transit.

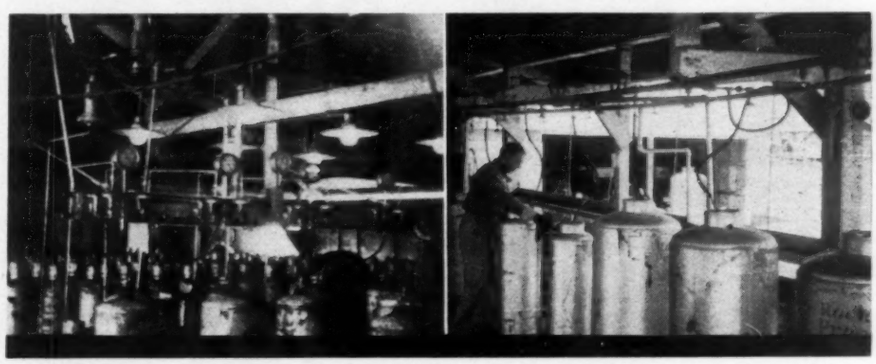
At the bottling plant, returned empty cylinders are first examined and serviced before refilling. The servicing consists of repairing or replacing damaged and worn valves, scraping dirt and rust from the cylinders and spraying with aluminum paint. They are then ready for refilling on the automatic cylinder-charging scales.

The cylinder-charging scales for vertical cylinders consists of 500-pound Fairbanks scales. The cylinder to be charged is placed on the scale and the scale balanced against the empty cylinders. The scale is then set at the desired weight and the cylinder connected by flexible hose to the supply line. When the weight of the gas desired has been fed into the cylinder, the balance arm of the scale moves upward tripping a lever which shuts off the supply of gas. This automatic device makes it possible for one man to attend the filling of from 5 to 10 cylinders at a time without waste depending on the size of the cylinders.

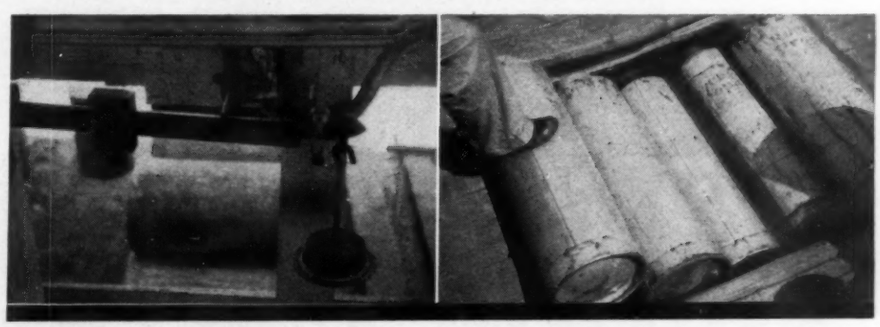
The mixtures of liquefied gas are delivered to each of the bottling plants through a 2-inch line and into a 1-inch header, then through diaphragm operated valves into the loading lines. The diaphragm operated valves are actuated by compressed air at about 25 pounds pressure controlled by the automatic trips working off the balance arms of the charging scales. The automatic devices controlling the charging of the cylinders on each scale consist of two block air valves which turn on and shut off the air pressure against the tops of the diaphragms on both the charging line valve and a return vent line valve.



All cylinder testing data are recorded at the Standard bottling plant on the pressure charts shown at left. At right, cylinder testing apparatus at the Imperial bottling plant.



Cylinder charging scales. At left, scales at the Standard bottling plant, and, at right, similar equipment at the Imperial bottling plant.



At left, the lever resting on the balance arm of the charging scale trips the block air valve on the supply when the balance point is reached. At right, the charged cylinders are rolled through a water bath to test for leakage.

When the empty cylinder to be charged is placed on the scale, the attendant opens the charging line by placing the lever of the first block air valve in the down position so that it will be tripped by the balance arm of the scale when the balance arms moves upward as the balance point is approached. In this

down position, of the block air valve trip, the air pressure is released from the top of the diaphragm, allowing the gas to flow into the cylinder. As the weight of the gas in the cylinder approaches the balance point, and the balance arm of the scale travels upward, the lever of the block air valve is tripped, sending air pressure to the top of the diaphragm which closes the valve on the charging line.

Since the lever of the block air valve does not trip until the balance arm passes the point of exact balance and due to a slight lag in the closing of the diaphragm operated valve on the charging line, the cylinder receives an over-load of from ¾ to 1½ pounds. To compensate for this, as soon as charging has stopped, the attendant sets a similar block air valve assembly at the opposite end of the scale balance arm. The lever to this valve is tripped by an extension to the balance arm. Thus, when the attendant sets this lever, air pressure is released from the top of the diaphragm which actuates a valve on the return vacuum vent line, allowing the excess charge to escape into the vent line.

As the weight of the gas in the cylinder approaches the balance point (the balance arm returning to the balance position), the balance arm trips the block air valve lever which actuates the diaphragm valve on the vent line. The arrangement of this block air valve assembly is such that the diaphragm valve is closed at the balance point, hence the charge of gas remaining in the cylinder is the exact amount required. Venting the excess charge serves also to allow any dry gas or air in solution with the liquefied gas in the cylinder to escape into the vent line.

As each cylinder comes off the charging scales it is rolled through a water bath to test for leakage. After the water bath the filled cylinders are loaded onto a truck for delivery to wharves or freight stations for shipment or are stacked on the loading platform until ordered. In the case of the Imperial Gas Co., those cylinders that are going to new bottled gas installations are equipped with a three-way cock and two standard lengths of metal tubing for connecting to two appliances or to two supply lines supplying two or more appliances. The daily output of both these plants is 5,000 to 6,000 gallons each.

These loading racks handle cylinders from 21 pounds capacity to 210 pounds capacity. Larger roll-on tanks up to 1,250 pounds capacity at the Imperial Gas Co. plant are filled on a larger charging scale equipped with the same automatic shut off device. This charging scale is located in a separate shed designed to permit ease of loading and unloading the roll on tanks from trucks.

Once every five years the cylinders must be subjected to the I. C. C. test.* This consists of measuring the permanent expansion of the cylinders when subjected to internal pressure. The procedure is to place the cylinder into a vertical cylindrical vessel and to fill the cylinder with water. The vessel is also completely filled with water until all air is excluded. The cylinder being tested is connected through the top of the pressure vessel to a hand pump which applies pressure to the interior of the cylinder. In the Imperial Gas Co. plant the water in the pressure vessel is connected to a burrett in which the displacement of the water is measured as the cylinder expands under pressure. When the pressure is released and the cylinder contracts back to its former shape, the reading in the burrett is noted. If more than 10 per cent of the expansion is recorded as permanent expansion, the cylinder is discarded. At the Standard plant the expansion is recorded on the chart of a pressure recording gauge. The serial number of the cylinder is written in on the chart opposite the pressure reading as are the temporary and permanent expansions of the cylinder. These charts are filled as a permanent record of the cylinders.

At the Imperial Gas Co. bottling plant the testing vessels consist of one measuring 2 feet in diameter by 5 feet in depth and another, 1 foot 2 inches by 4 feet in depth. Both are galvanized tanks provided with covers that are sealed by six clamps and rubber packing. Standard's testing equipment is very similar. Cost of construction of such testing apparatus, complete with burretts, or gauges, hoist, etc., may be from two to eight thousand dollars. Cost of testing the cylinders varies from $.75 to $1.50 per cylinder.

Both the Standard and Imperial bottling plants make domestic and foreign shipments, Standard shipping to its various wholesale and retail outlets and Imperial to its several company owned retail outlets and to appointed distributors throughout the United States and many foreign countries.

* For more complete data on the I. C. C. test and the design of cylinders, see pg. 79, Western Gas, September 1933 or Chapter XV, Handbook of Butane-Propane Gases, Second Edition, and pg. 47, Western Gas, September 1931.

■ ■

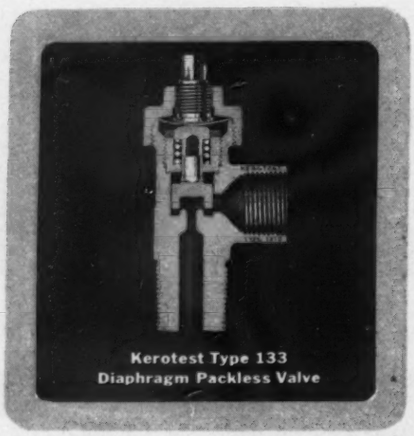
Patterson Now Land Head of Louisiana Gas

T. C. Patterson was last month appointed head of the land department of the Arkansas Louisiania Gas Co., Shreveport, La., according to an announcement from D. W. Harris, vice-president and general manager of the company. Mr. Patterson, who had been in charge of land records and contracts since 1920, replaces Herschell Scivally, who resigned to enter the oil business. For 10 years prior to his connection with the Shreveport utility, Mr. Patterson had been connected with the United Fuel and Gas Co., Charleston, W. Va.

■ ■

Construct Wyoming Lines

Mountain States Power Co., Casper, Wyo., is tying in its carrier from the Grass Creek field to Thermopolis with the Big Horn Gas line from Buffalo Basin to Grass Creek. Three miles at the Grass Creek end of the Big Horn line is being increased from 3- to 8-inch pipe. The Mountain States Co. will lay 12 miles of 4½-inch line to Golden Eagle Dome and 24 miles of 6-inch line into Thermopolis.



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Imperial Gas Buys San Diego Bottled Gas Concern

The Imperial Gas Co., Los Angeles, last month purchased the bottled gas business of the San Diego (Calif.) Bottled Gas Co., according to A. N. Kerr, president of the Imperial Gas Co. This property consists of approximately 350 installations and is the third one acquired by Imperial this year.

The Imperial Gas Co. already serves several hundred customers in the vicinity of San Diego through its Rockgas Service Co. under the management of Lester Kling. The combined bottled gas and Rockgas business will now be handled by Mr. Kling under the name of Rockgas Service Co., Fisherman's Wharf, San Diego.

■ ■

Natural Replaces Bottled Gas In Eunice, Louisiana

Natural gas replaced 600 B.t.u. liquefied petroleum gas in the municipally-owned distribution system of the Eunice Gas Co., Eunice, La., on November 14, when a 14-mile transmission line was completed and connection was made between the company's distribution system and the Tepetate oil fields, which will supply the gas, according to press dispatches. Favorable weather and rapid shipment of the 59,400 feet of pipe used in laying the transmission line enabled S. I. Blake, contractor, to complete the line three weeks ahead of schedule. M. J. Guillory is manager of the Eunice Co., which serves some 200 meters.

■ ■

Tidewater Oil To Produce Butane, Propane in 1937

Tidewater Oil Co., New York, N. Y., will construct a propane-butane rectification plant at its Bayonne, N. J., refinery, capable of producing 45,000 gallons of propane and 7500 gallons of butane per day, according to press dispatches. Refinery gases, formerly serving as fuel at the refinery, will be used. It is expected that production of commercial propane and butane will begin in the latter part of January, 1937.

■ ■

Dickey Oil Co. Constructs Natural Gas Line

Dickey Oil Co., Wichita, Kan., last month started construction on a 4-inch, 8½-mile transmission line to carry natural gas from the Goering wells in the Graber pool east of McPherson, Kan., to connect with the trunk line of the Kansas Power & Light Co., Salina, Kan., northwest of Moundridge. The gas line will parallel the oil company's new 4-inch oil line now under construction from the Graber field to the pumping plant in the Canton-Ritz field.

■ ■

Archer Joins Ebasco

J. C. Archer, assistant auditor for the Houston Gas & Fuel Co., Houston, Texas, has accepted a position with Ebasco Services, Inc., according to a recent report from company officials. Henry Buttelman, credit manager, will assume Mr. Archer's duties. Mr. Archer's first work in his new position will be the working out of a new plan to facilitate the handling of gas company customers.

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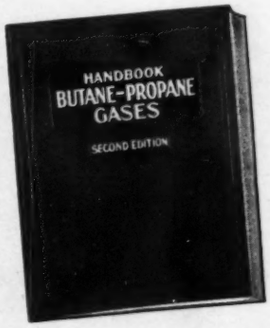

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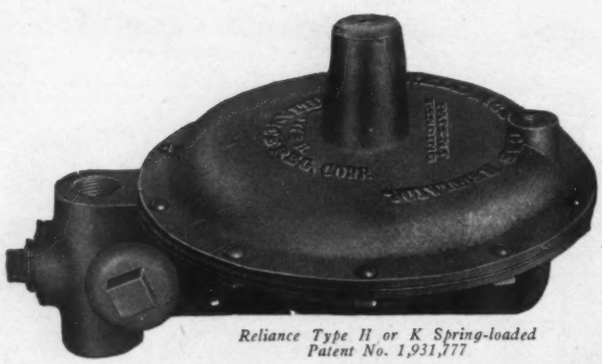

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MEASUREMENT and CONTROL

Large S.C.M.A. Groups Hears Measurement Papers

WITH 85 members present, the Southern California Meter Association's November meeting, held at the Van Matre Inn, Huntington Park, was featured by the largest regular-meeting attendance in several years, according to Guy Corfield, research engineer for the Los Angeles Gas & Electric Corp. and president of the association.

Two papers were presented. E. W. Morris of the Westinghouse Electric & Manufacuring Co. offered an illustrated discussion on "The Industrial Application of the Vacuum Tube" in connection with measurement, control, and instrumentation. S. A. Walsh, chief dispatcher, Industrial Fuel Supply Co. and the Southern Fuel Co., explained in detail the management of one of the largest gas dispatching systems in the world, that serving the Los Angeles area.

Entertainment during and after dinner was furnished through the courtesy of the Robinson Orifice Fitting Co., with Gordon Greene, sales manager, acting as master of ceremonies.

■ ■

Gibson Succeeds Jarboe As Cities Service Meter Head

V. C. Jarboe, superintendent of the meter department of Cities Service Gas Co., Kansas City, Mo., has resigned his position to take up residence in Long Beach, Calif. C. N. Gibson has been appointed to the vacated post.

Mr. Jarboe was first employed in the industry in 1896 by the Kansas City Gas Co. He left in 1910 to become general superintendent in charge of operations for the Kansas Natural Gas Co. Prior to his connection with the Cities Service Co., Mr. Jarboe had been successively superintendent of transportation and superintendent of the pipe line department for the Empire Gas & Fuel Co., Bartlesville, Okla.

■ ■

Jenkinson of B. C. Electric Railway Co. Dies

John Jenkinson, superintendent of the meter department of the B. C. Electric Railway Co., Vancouver, B. C., passed away October 14 at the age of 66. Mr. Jenkinson joined the company in 1898, becoming superintendent of the meter room in 1912. In 1905 he organized the B. C. Electric Technical school, and was the first to introduce safety measures into the company's plants.

■ ■

P. G. and E. Lowers Mains

Pacific Gas and Electric Co. is lowering its mains for a distance of about a mile on the highway between San Mateo and Redwood City. Widening of the El Camino Real, the main Coast highway, necessitates this work which is being done at a cost of several thousand dollars.

Using the Meter in Gas Flow Studies

(Continued from Page 14)

stream pressure acts. The other hollow rod extends across the upstream face of the disc as far as its center, the end through which the upstream pressure acts being open and perpendicular to the face of the disc. The upper ends of these hollow steel rods are encased in a protective tube which extends out of the main through a stuffing-box fashioned from a nipple, or coupling, welded or clamped to the main. The size of the disc is dependent on the size of the main and the velocity of gas travel, but should be such that the area of annular escape around the disc is from 0.2 to 0.5 times the total cross-sectional area of the main.

The preliminaries of insertion of the disc element are similar to those making an ordinary gas service connection. A service clamp with lead gasket, is fastened about the main with the outlet of the clamp located just where it is desired to insert the element, and by use of a tapping machine a hole is drilled in the main wall through the clamp outlet. Fig. 2 shows method of suspending the anti-orifice on the main. The element is wrapped around its suspension rods to form a thin cylinder, so that it can be inserted in the main through the one-inch or two-inch hole made by the tapping tool. When the tension of it is released as it passes through the hole, the element will snap back to its original form of a flat disc. A split collar is then slipped around the suspension rod into the outlet of the service clamp—its purpose being not only to center the element and to act as the base of the stuffing box, but also by filling the hole in the main wall to reduce distortion of flow around the disc at that point to a minimum. The dimensions of this collar are shown in Fig. 3.

The space above the collar is then filled with valve stem packing material and a drilled plug or reducer inserted in the service clamp outlet. As this plug is screwed into place, it compresses the packing against the tube of the element and prevents escape of gas. By check marks on the tube the disc can be properly orientated with respect to the flow of gas before the stuffing-box is tightened.

The element need not necessarily be removed from the main when flow studies are interrupted. The stuffing-box holding the pressure tube can be loosened and the element turned 90° until its face is parallel to the gas flow, and the stuffing box retightened to hold it in position and prevent the escape of gas. In this position the resistance of the element to the flow of gas is negligible.

When it is desired to remove the element, it is rewound around the pressure tubes while still in the main, by use of the "fork" shown in Fig. 3. To do this the stuffing-box and split collar are removed and the head of the fork screwed into the outlet. Then as the element is turned, the prongs of the fork wrap the disc into a cylinder. After one or two turns the element is pulled up partly into the hole in the main wall, and any additional winding that is necessary is performed by turning the element while holding it firmly up against the edges of the hole.

Because of their elasticity, there will be a tendency for anti-orifice discs made of spring steel metal to bulge in an upstream direction if located in streams of high velocity. To avoid errors of practical size caused by this flexing, it is recommended that in using spring steel discs the product of the inches diameter of the disc by the inches of water column of the differential across the disc be less than 20.

Any metering element temporarily introduced into metropolitan mains should not cause a drop in pressure of more than 1 inch in 5 to 7 inches of water column at maximum rates of flow, or ten inches of water column in mains operating at five to ten pounds per square inch. Thus the maximum anti-orifice differentials permissable are 1.5 inches of water column in low pressure service or delivery mains, and 15 inches of water column in transmission mains.

A low range differential recorder of the fluid balance type has been used in connection with the anti-orifice meter during development tests. The pen arm of this instrument is equipped with a square root cam which modifies its degree of movement in such a manner as to record the square root of the differential, so that the volume of gas passing (at constant pressure, temperature, and gravity) can be determined from the chart record through multiplication by a single factor. For low differential ranges, up to five inches of water column, the liquid used in this fluid balance may be either water or gauge oil; use of the latter fluid permits calibration of the instrument with an accuracy of 0.01 inch of water column with 10 inches static pressure. For transmission main work, by using tetrabromethane a differential range of 10-12 inches at 10 pounds static pressure can be obtained.

Two-pen, duplex diaphragm types of recorders can also be used in connection with the anti-orifice element, one pen recording the upstream pressure and the other the downstream pressure. These are preferable where the flowing pressure varies appreciably, since the upstream diaphragm pen will record such variations. This duplex-diaphragm type of recorder is available with accuracies of 0.1 inch of water column in a 10 pound range.

One of the most successful uses of the flexible spring-steel anti-orifice disc to produce differential pressures characteristic of rates of flow in mains, was an application by the Public Service Co. of Northern Illinois. The discs were introduced into mains at or near district regulator vaults in the manner described previously in this article, the differences in pressure at wall taps ahead of and behind the discs being used to control the operations of cold oil-foggers located in

the regular vaults. With an increase in the rate of travel of gas past a disc, there was an increase in the differential pressure, which effected an increase in the quantity of oil vaporized into the mains at that point.

Recently an instrument company has placed on the market an alarm utilizing a flexible steel disc inserted through a small opening in piping already in place, the movement of this disc being used to indicate too high or too low rates of flow of fluids in the piping.

The above are applications of the anti-orifice disc intended to utilize, rather than to measure, fluid flows. Derivation of the discharge coefficients of this disc makes possible its use as a metering element. There are at least three applications of the flexible form of anti-orifice disc to flow measurements in metropolitan mains which should be of particular interest to those entrusted with the testing and maintenance of distribution systems: (a) sub-metering to locate districts of high gas losses, (b) making "running" tests of mains to determine gas losses therefrom, and (c) testing of pressure regulators in place.

The general locations of losses of gas from mains can be determined from comparisons of the volume of gas entering and leaving particular sections of the system during a defined period of normal operation—the inputs being measured by permanent district meters, and the outputs by customers' or other receival meters. This method of distinguishing the districts in which losses occur is a standard procedure in natural gas pipeline operations; in most metropolitan mains systems the gas is metered only at the production or sendout stations and at the customers' meters. The use of district meters in metropolitan distribution systems has been frequently proposed or studied, but has not been widely attempted because of the high cost of the meters hitherto available, as compared with the savings to be effected by reductions of gas losses; and also, because of the trouble and cost of installing large capacity meters in systems already in operation. However, the difficulties attending the installation of impellor or orifice meters for district metering can be avoided by using flexible anti-orifice disc elements, the labor and cost of installing this form of meter being comparable to that of making an ordinary service connection.

When there is found to be an appreciable difference (more than 5 per cent) between the quantity of gas input as indicated by a secondary or district meter, and the sum of the quantities of gas sold or received in the district supplied through that meter, more exact locations of the losses can be approached by making "running" tests of the major mains in that district. In this test, anti-orifice meters are inserted at each end of a suspected section of main. Differences in the differentials across the discs afford measures of the volumes of gas lost from the main between the two test locations. If the loss is great, halves of the section of main originally tested are subjected to the same test, that half in which most of the loss exists again being halved and tested, and so on until the exact location of the loss is determined. Thus, without having to shut down sections of mains or interrupt the flow or service of gas to customers, the existence of losses in particular districts can be detected, and then the locations of these losses found, by use of anti-orifice meters.

It is believed that the flexible anti-orifice disc can be used to determine the efficacy of a pressure regulator in place, although work in this direction has as yet been restricted to a few shop tests. The element is inserted through a tap in the main downstream from the regulator, and the variations in pressure and flow differentials of the gas leaving the regulator under various demands are noted.

The pressure of the gas leaving a theoretically perfect regulator should be constant regardless of the rate, or changes in the rate, of gas flow. If the regulator sticks and does not react, the delivery will remain constant, and an increase in the differential at the downstream test anti-orifice (or orifice) will be reflected by a decrease in the pressure in the outlet main. With a dead or "stuck" regulator, a 10 per cent increase in differential at the test point will be reflected by a 10 per cent decrease in the absolute pressure at that point according to the basic flow formula, $V = C\sqrt{hP}$, for $hP = h^1P^1$ and $h:h^1 = P^1:P$.

In normal regulators, if the downstream demand is suddenly increased there will *tend* to be a drop in pressure at the regulator outlet, due to the time required for its valve to open enough to deliver the increased volume. But this drop in pressure $(P - P^1)$ in the case of an active regulator will be momentary and will be smaller than the increase in flow differential $(h^1 - h)$. This is due to the race made by the regulator to increase its delivery and maintain the pressure constant, against the tendency of the pressure to drop due to the increased rate of removal of gas therefrom. The more sensitive or capable the regulator, the smaller will be the variation in pressure with respect to the variation of the flow, or the greater will be the difference between $(P - P^1)$ and $(h^1 - h)$.

The sensitivity of the regulator can be evaluated on the basis of the ratio of the proportional changes in differential and pressure occuring with variations in demand or flow, by use of the formula:

$$S = 100\left[1 - \left(\frac{P - P^1}{P}\right) / \left(\frac{h^1 - h}{h}\right)\right]$$

in which

S = a percentage expression of the capability of the regulator,

P = the original main pressure at the upstream anti-orifice tap,

P^1 = the minimum main pressure at the upstream anti-orifice tap, when the rate of flow is increased,

h = the original differential at the anti-orifice,

h^1 = the differential at the anti-orifice at the time of the minimum upstream pressure reading P^1.

If the regulator is perfect in action, $(P - P^1)/P$ tends to equal zero and S, becomes 100. If the regulator sticks and does not act, $(P - p^1)/P$ tends to equal $(h^1 - h)/h$, so that the percentage sensitivity approaches zero.

Bastian-Morley Co. Makes Personnel Changes

BASTIAN-MORLEY Co., Inc., LaPorte, Ind., announces the appointment of Jim Donnelly as sales manager, J. P. Hutchinson as assistant sales manager, and R. I. Smith as manager of the testing and inspection department.

Mr. Donnelly joined Bastian-Morley Co. in 1923 following several years in the advertising and merchandising field. In 1926 he was made advertising manager and in 1928 sales promotion manager. In his new position as sales manager he will retain supervision of advertising and sales promotion.

Mr. Hutchinson has been with the company since 1929, specializing in gas boiler sales and assisting in general sales and sales promotion. Mr. Smith was sales representative in the Philadelphia area from 1935 until his recent appointment. He is an electrical engineer and was in the public utility field for many years before joining the Bastian-Morley organization.

■ ■

New Mexico Bureau Issues Revised Oil and Gas Map

The State Bureau of Mines and Mineral Resources of the New Mexico School of Mines, at Socorro, issued last month a revised edition of the "Oil and Gas Map of New Mexico," which is included in Bulletin 9 of the Bureau, "The Oil and Gas Resources of New Mexico," by Dean E. Winchester.

According to E. H. Wells, Director of the Bureau, the map shows the axes of nearly 200 anticlinal structures, and the location, total depth and results (by symbol) of approximately 1200 wildcat wells. Known oil and gas fields are indicated, and the location of main oil and gas pipe lines, refineries and natural gasoline plants are shown. Areas where carbon dioxide gas occurs are indicated. The map is printed in one color, with a scale of 1 to 1,000,000, or approximately 1 inch to 16 miles.

■ ■

Laura Judd, Home Service Head of Cincinnati Co., Dies

Laura Judd Bryant, since 1929 home service director for the Union Light, Heat, and Power Co., Cincinnati, Ohio, passed away November 5 after a long illnesss. Although confined to her home by illness, Miss Bryant maintained active contact with her department until shortly before her death. Nationally known as a dietician and in the home economics field, Miss Bryant became especially popular with thousands of housewives in the Cincinnati area both through her cooking school activities and her newspaper writings.

■ ■

Dallas Utilities Open Branch

Oak Cliff, Texas, was last month afforded an improved gas service when the Dallas Gas Co. and the County Gas Co., both of Dallas, Texas, opened a branch office in the Medical Dental building. The new office, which is under the supervision of H. F. Sanders, Dallas Gas Company commercial office manager, will display a complete line of modern gas appliances.

Unanimous Vote Continues Mystery Chef Program Until Nov., 1937

THE directors of Regional Advertisers, Inc., by unanimous vote, have decided to continue the Mystery Chef radio program for another year starting December 1, 1936, and ending November 27, 1937, for a trial of 104 broadcasts over the split red network of the National Broadcasting Company. Eastern stations to be used are identical with those now in use.

Eight companies on the Pacific Coast have also joined the eastern companies in continuing the program.

The program will be broadcast over the eastern stations, with the exception of Rochester and Syracuse, which will use transcriptions, at 11:30-11:45 A.M. New York time, Tuesday and Saturdays. Pacific Coast companies will receive the program as rebroadcast from N.B.C. studios in New York by transcontinental telephone at 1:00-1:15 P.M. New York time on Tuesdays and Saturdays (10:00 to 10:15 A.M. Pacific time and 11:00 to 11:15 A.M. Mountain time.)

Contracts for a second year's continuation of the program call for participation of eastern companies having nearly 5,000,000 gas meters in operation and Pacific Coast companies having approximately 1,000,000 meters in operation. In addition, a number of companies will continue to use the program over local stations by means of electrical transcriptions.

Demand for the recipe book "Be an Artist at the Gas Range" has reached such proportions that a large reserve supply of books held at the printers at Buffalo, New York, has been completely exhausted. As of November 24 more than 1,000,000 books have been moved from the printers to participating companies on order.

The directors of Regional Advertisers have authorized an additional printing of 500,000 books and these are expected to come from the presses at the rate of 50,000 copies a day starting December 9th.

Although the program for the coming year will not differ fundamentally from that presently broadcast, there will be a closer tie-in with the themes emphasized in the national advertising program. Also, more material of a commercial nature will be introduced, particularly in reference to the latest improvements found on gas ranges. In the new edition of the recipe book and in future scripts the waterless cooking method will be recommended along with the low water method used by the Chef.

A number of companies will resume the use of electrical transcriptions beginning in January.

■ ■

Optimistic Note Features A.P.I. Meeting

Optimism was the keynote during the seventeenth annual meeting of the American Petroleum Institute held November 9 to 12 at the Stevens Hotel in Chicago. According to A.P.I. President Axtell J. Byles, the oil industry for the first time in several years is in a position where it is unnecessary to take immediate action on a single pressing problem. Given as reasons for improved condition in the industry were control of production along with conservation and economic requirements and the large increase in consumptive demand allowing the liquidation of burdensome crude oil inventories.

Axtell J. Byles was re-elected president of the Institute and W. R. Boyd, Jr., were re-elected president and executive vice-president respectively of the Institute. The board of directors was increased to a membership of 105.

■ ■

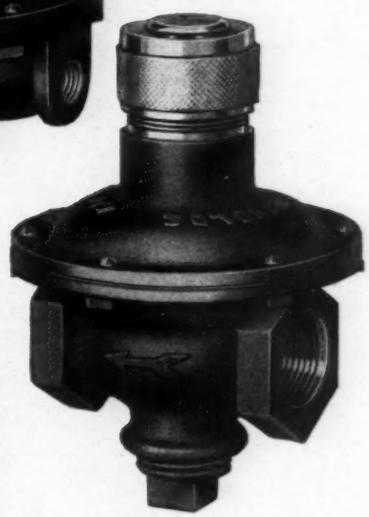
Tiny Tot Conducts Cooking Schools

Six-year-old Barbara Jenkins was the unusual cooking demonstrator presented by The Gas Service Co., Kansas City, Mo., in schools conducted by the company in six Kansas cities where the company has properties. The public demonstrations in Kansas City, Topeka, Wichita, Hutchinson, Newton, and Parsons, followed her appearance in Kansas City, Mo., during the Jubilesta, when more than 5,000 persons watched the little girl prepare meals in the Municipal Auditorium.

Barbara, a Denver miss, is able to prepare approximately 150 different dishes without the aid of a cook book or help from any person. Her mother first interested the child in cooking when she was only a year old, sitting in her high chair in the family kitchen.

☆ Reynolds

Left: Reynolds new R-10016-E2 Range Regulator with automatic cut-off. Brass body—spring type operation. Recommended on low inlet pressure, reducing to inches W. C.



Right: Reynolds new R-10070-E2 Refrigerator Regulator with automatic cut-off. A companion regulator to R-10016-E2. Also recommended on pilot control and other small volume installations.

☆ Here are two new, modern Reynolds Gas Regulators meeting the demand for small volume pressure control where automatic cut-off is either desirable or absolutely essential.

Sturdy, compact construction affords easy installation. Primarily designed for use on gas range and gas refrigerator regulation, these models are ideal on pilot control or any installation where accurate pressure control of small volume is required. Write for complete details.

BRANCH OFFICES

421 Dwight Building
Kansas City, Missouri

2nd Unit Santa Fe Building
Dallas, Texas

REPRESENTATIVES

Eastern Appliance Company
Boston, Massachusetts

F. E. Newberry
Avon, New Jersey

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

COMMITTEE

A. C. Joy, (P. G .& E.)
Chairman

J. S. Spaulding
(L. A. G. & E.)

Forrest Raymond
(San Diego Cons.
G. & E. Co.)

Load Building News

P. C. Gas G. A.

THE MODERN FUEL

COMMITTEE

Douglas Buckler
Southern California
Gas Company

Clifford Johnstone
Managing Director
Pacific Coast Gas
Association

Eighth consecutive year of regional cooperative advertising, Pacific Coast Gas Association

GAS COMPANIES COOPERATE IN DECEMBER MESSAGE TO PROMOTE GAS RANGE SALES

"Lucky You
If Santa receives
thought-waves,
I'll get a new
Gas Range too."
A DOUBLE thrill:
Dress up your kitchen with a modern GAS range. And with its aid, be the marvelous cook that men praise; as well as the dainty, youthful, vivacious companion they so admire.
These advantages, and more, are yours in the smartly colorful new models, with their galaxy of features:
Automatic oven heat control (baking success insurance) • Time clock control; frees you for rest or recreation • Perfected insulation; keeps kitchen cool, saves gas • Self-lighting burners throughout • Smokeless broiler • Non-clogging, high-low simmer burners • Closed-top work table • Easy rolling utensil drawers • Flood light and condiment set • Enduring, easily cleaned enamel, outside and in • Stream-lined design, modish as next month's "Vogue."
Only today's GAS range gives you all these, plus instant full heat with countless variations. Your Gas Company or Appliance Store offers prices so reasonable, terms so liberal, you need not endure your old stove another day.—Pacific Coast Gas Association, Inc. (a non-profit service organization of which your Gas Company is a member), 447 Sutter Street, San Francisco.
HINT to HUSBANDS
A LITTLE LUXURY-GIFT for sentiment—and a modern Gas Range to remind her of your thoughtfulness for months and years. It's the perfect formula: happiness for her; new mealtime delights for you. Man, you can't lose!
Gas
THE MODERN FUEL

D. L. Scott to Head P.C.G.A. Educational Committee

JAMES F. Pollard, president of the Pacific Coast Gas Association, last month appointed D. L. Scott, personnel manager for the Los Angeles Gas & Electric Corp., to the chairmanship of the Association's Educational committee, succeeding H. T. Brain, who has resigned his post with the Pacific Gas and Electric Co. to become regional personnel manager for General Motors.

F. E. Wilson, Pacific Gas and Electric Co., chairman of the subcommittee on pipe lines, Transmission committee, announces that his committee will study the latest practices in welding, load dispatching, leak repair, internal corrosion, and dehydration. Membership of Mr. Wilson's committee includes P. E. Beckman, A. L. Hill, J. A. Love, and R. T. Peterson of the Pacific Gas and Electric Co.; M. T. Burton, J. W. Farner, B. M. Laulhere, and M. D. Pfleider of the Southern California Gas Co.; F. E. Jinnett of Southern Counties Gas Co.; and R. D. Smith of Montana Power Co.

Guy Corfield, Los Angeles Gas & Electric Corp., chairman of the Utilization committee, announces that J. E. C. Currens, Pacific Gas and Electric Co., has accepted the chairmanship of the subcommittee on Employee Training for Customer Utilization Work.

■ ■

P.C.G.A. Figures Show 1936 Gains Over 1935

A STATISTICAL statement issued by the Pacific Coast Gas Association comparing gas company operations during the first 9 months of 1936 with a similar period in 1935 reveals a gain in every department. The report includes operations in California, Arizona, Nevada, Oregon, Washington, and the Province of British Columbia.

Following are general figures included in the report. Production in M.c.f.: (1935) 138,162,042 as against (1936) 150,106,422, showing a gain of 8.6 per cent. Active meters as of September 30: (1935) 1,673,855 as against (1936) 1,729,865, a 3.3 per cent gain. Sales in M.c.f: (1935) 121,079,412 as against (1936) 132,885,725, a gain of 9.7 per cent. Gross revenue: (1935) $59,646,045 as against (1936) $61,094,594, showing a 2.4 per cent gain.

■ ■

Cities Service Completing New Line From Kansas Field

A MARKET for approximately 6,000,000 cubic feet of natural gas daily going to waste in the Wellington oil fields northeast of Wellington, Kan., will be provided shortly after the first of the year when the Cities Service Co. of New York completes four miles of 12-inch pipe line to carry the gas from the field to a compressor station now under construction near Wellington, according to J. C. Boyer, foreman in charge of construction.

The line now under construction is of sufficient capacity to allow for increases in production from the Wellington field. At the compressor station two single compressors of 80 horsepower and a twin compressor of 150 horsepower are being installed. A residence will be built at the plant and three men given steady employment.

Another 4-mile line will connect the compressor station with a main transmission line of the Cities Service Co., which runs east of Wellington to Oklahoma City, supplying gas to Topeka, Kansas City, Mo., and other towns in the area. After the completion of the project, the Wellington Gas Co. will tap this line for fuel produced in the local field, according to I. G. Reese, manager of the Wellington Co.

■ ■

Empire Gas Reopens Junior Engineering School

AFTER a lapse of five years, Empire Gas & Fuel Co., Bartlesville, Okla., has reestablished its junior engineering school, according to an announcement by H. R. Straight, vice-president and general manager of the company. Clay Briggs, the company's chief engineer, has been placed in charge.

While past policy of the school has been to choose training school candidates from current graduating classes of universities throughout the country, under the new regime training will first be offered to college men already employed by the company. Still another innovation in the revived school is the acceptance of men who are graduates from other than engineering or geological institutions.

The course will cover a two-year period, with a new class to be selected each year. Each member of the class will have opportunity to gain a working knowledge of each department of the company during his training period.

■ ■

New Jersey Gas Association Holds Regional Meetings

Over 2,500 gas men and women attended the regional meetings of the New Jersey Gas Association held at Asbury Park, Newark, Hackensack, Vineland and Camden during November. W. S. Potter, treasurer of the Elizabethtown Consolidated Gas Co., and president of the association, officiated.

William Walsh of the Elizabethtown Consolidated Gas Co. discussed the flexibility of gas for cooking. The second annual prize paper contest was announced, the subject being "How Can I Help My Department Contribute Most to My Company in 1937?" Last year's contest attracted over 75 papers.

■ ■

Bay Bridge Forces P. G. and E. To Relocate Lines

Relocation of 20,400 feet of gas mains in Oakland was necessitated by the widening of streets and other work in connection with the Oakland approach to the San Francisco Bay Bridge opened last month.

The work, completed by Pacific Gas and Electric Co. at an approximate cost of $60,000, included lowering of large mains, the laying of additional mains to tie in dead ends, the replacing of many mains with larger sizes, and moving back of a number of services on account of widening the streets. The area affected included the San Pablo Avenue underpass, 38th Street at San Pablo, Cypress, 34th Street, Hollis, and San Joaquin.

Appliance Directory Issued by A.G.A. Laboratories

The American Gas Association Testing Laboratories presented in October the quarterly "Directory of Approved Gas Appliances and Listed Accessories." The booklet, which is the largest ever published, lists 106 concerns producing water heaters for use with city gas, 99 engaged in manufacturing central heating appliances, 75 firms making gas space heaters, and 72 range manufacturers besides producers of accessories and other types of domestic gas-burning equipment. The increase in the size of the register is due more to the introduction of new models than to entrance of new concerns in the gas appliance field.

The book may be obtained from the A.G.A. Testing Laboratories, 1032 East 62nd Street, Cleveland, Ohio. Prices are 35 cents for the quarterly issue, 10 cents for monthly supplements, and $2 a year for all directories and supplements.

■ ■

A.G.A. Industrial Committee Meets to Form 1937 Program

The Managing Committee of the Industrial Gas Section of the American Gas Association met at headquarters in New York, December 8, with Ralph Manier, industrial engineer of the Syracuse Lighting Co. Inc., Syracuse, N. Y., acting as chairman. Ways and means for promoting the use of gas in factories and commercial establishments were discussed and an aggressive plan developed. The use of gas in industry has expanded to the point where more industrial gas is being sold today than during the previous peak year 1929, according to Mr. Manier.

Calendar

December

National Association of Manufacturers—Waldorf Hotel, New York, N. Y., December 9-10.

Mid-Continent Oil & Gas Association—Annual meeting of general Board of Directors, Tulsa, Oklahoma, December 15.

January, 1937

National Bottled Gas Association—6th Annual Meeting, Waldorf-Astoria Hotel, New York City, N. Y., January 20.

American Society of Heating & Ventilating Engineers—Hotel Statler, St. Louis, Mo., January 25-27.

February, 1937

Southern Gas Association—Southwest Regional Gas Sales Conference, Peabody Hotel, Memphis, Tenn., February 10-12.

March, 1937

American Society for Testing Materials—1937 Regional Meeting and Committee Week, Palmer House, Chicago, March 1-5.

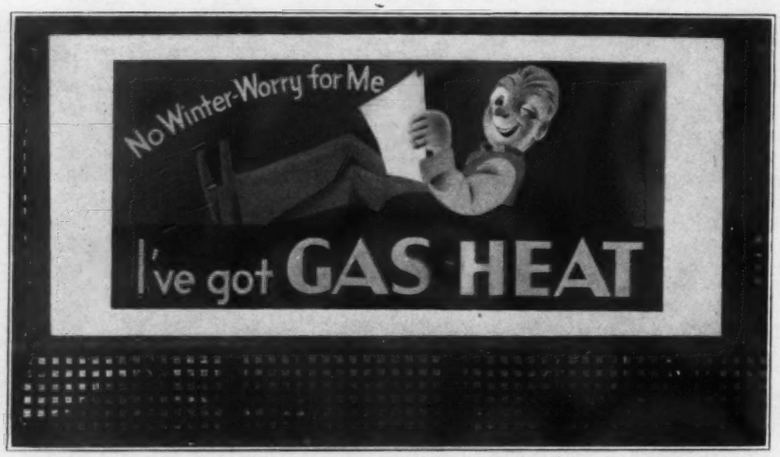
June, 1937

Canadian Gas Association—30th Annual Convention, Chateau Laurier Hotel, Ottawa, Canada, June 10-11.

American Society of Heating and Ventilation Engineers—New Ocean House, Swampscott, Mass., June 24-26.

October, 1937

American Society for Metals—1937 Metal Congress and Exposition, Atlantic City Auditorium, Atlantic City, N. J., October 18-21.



Billboard of the Peoples Gas Light & Coke Co., Chicago, which won national recognition in the Outdoor Advertising Art Exhibit contest last month.

Peoples Gas Light and New York Edison Win National Billboard Awards

NATIONAL recognition is brought to the advertising departments of The Peoples Gas Light & Coke Co. and New York Edison Co. through the winning of special awards offered in a national contest conducted by The Outdoor Advertising Art Exhibit committee, representing the Outdoor Advertising Association of America, Inc., American Association of Advertising Agencies, and the Association of National Advertisers, Inc., to determine the best billboards for the year ending September 1, 1936.

Presentation of the awards was made during the seventh annual exhibition of Outdoor Advertising Art, held in Chicago, November 19-28. The exhibit with its associated awards, has been established to give recognition to advertisers and artists engaged in work of special distinction in the field of outdoor advertising. Artists, advertisers, lithographers, advertising agencies, and special outdoor agencies throughout the United States participate in the annual contest.

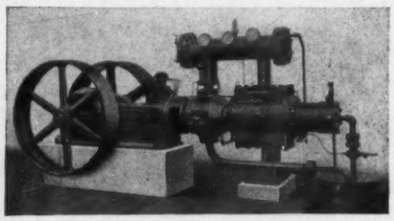
Ray Fenton, assistant advertising manager of The Peoples Gas Light & Coke Co., and Ray Martin, display manager of the New York Edison Co., were responsible for the award-winning posters of their respective companies. Clayton G. Cassidy is advertising manager of The Peoples Gas Light & Coke Co., and Henry Obermeyer has charge of advertising for the Consolidated Edison of New York, with which the New York Edison is affiliated. The two utilities were the only companies doing a purely local business that received awards. All other awards went to large companies doing business on a national scale.

■ ■

Worthington Corp. Improves Three-Stage Compressor

AN improved line of single horizontal three-stage compressors for pressures from 750 to 2,500 pounds is offered by Worthington Pump and Machinery Corp., Harrison, New Jersey.

These compressors are suited for higher pressures, since the compression cylinder requires only one packing box subjected to moderate pressures, thus reducing leakage.



This feature is desirable in compressing valuable or inflammable gases.

The compressor is applicable for high air pressure, and for the compression of oxygen, hydrogen, helium and other special gases as well as for refinery gas or straight natural gas.

Double-row tapered-roller bearings, automatic self-oiling frames with oil-tight covers, Worthington Feather and ring plate valves, and efficient inter-cooling between stages are features of the improved line. A choice of steam or motor drive is offered on all sizes.

Bulletin L-611-B12, obtainable upon request to the manufacturer, shows a sectional view of a compressor and gives detailed specifications.

■ ■

Petroleum Exposition To Be In May, 1938, at Tulsa

The next International Petroleum Exposition will be held in Tulsa, Oklahoma, May 14 to 21, 1938, celebrating its fifteenth anniversary, according to an announcement at the American Petroleum Institute meeting in Chicago.

Exposition President, W. G. Skelly of Skelly Oil Co., who made the announcement, said that the Tulsa oil show expects to exceed its exhibit and attendance records in 1938, pointing out that before definite dates were announced, three-fourths of the available space on the 20-acre plant site had been reserved.

The exposition is held every two years, at the request of the oil industry which owns and controls the non-profit institution.

The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

U. S. SUPER de LAVAUD CAST IRON PIPE

"Cast without chill in a metal mold"

U. S. PIPE AND FOUNDRY COMPANY
Burlington, N. J.

REDUCED GAS RATES
GAS BILL
Cut HEATING COSTS
HEATING COST CALCULATOR
Figure it out for yourself
20,000 B. T. U. A. G. A. INPUT RATING
$1.26 HOURLY OPERATING COST
$1.06 HOURLY OPERATING COST
$ .96 HOURLY OPERATING COST
New Reduced Gas Rates Save You Money

MADE 'SPECIALLY FOR RETAIL APPLIANCE DEALERS

WHAT IT IS: A vest pocket manual of information on gas heating and water heating **plus** a handy calculator of operating costs.

HOW IT WORKS: Each page is given to one particular type of appliance—a picture and a brief explanation of what the appliance is and what it will do.

THE CALCULATOR is built into the back cover. The cover is double with four little windows punched in one end. Inside is a printed card. The card is set by sliding it in or out until the figure in the top window corresponds with the A. G. A. rating of the appliance. This done, the figures in the lower windows will show the **maximum** hourly operating cost.

OBVIOUSLY this little device is a selling tool. It supplies a quick, positive answer to any question about operating cost. It explains "B. T. U."—gets the customer to think in terms of heat-units-per-dollar. It shows heating, cooking and water heating to be separate and distinct services, even though billed as one. In short, it sells the economy of gas fuel—helps you sell the appliances. Every customer, whether he buys or not, should take one of these booklets away with him.

ORDER A SUPPLY FOR CUSTOMER DISTRIBUTION . . . . TODAY!

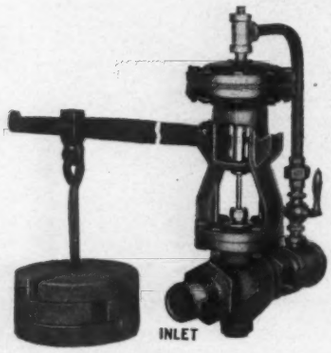
P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

Owned · Operated · Managed by Californians

WG 212-1236

. . for high pressure oil and gas lines



High Pressure Regulator

Two thousand pounds pressure to the square inch can be controlled, and gas can be passed on to the main or the distributing line at reduced pressure to suit requirements, by the use of the proper C-F Regulator. Standard Regulators are designed for pressures up to 600 pounds. For higher pressures, designs are adapted according to specifications.

THE CHAPLIN-FULTON MFG. COMPANY

28-40 Penn Avenue **Pittsburgh, Pa.**

REPRESENTATIVES

WESTCOTT & GREIS, Inc.
Sales and Service
Dallas — Tulsa
Los Angeles, Calif.

JNO. W. CRAWFORD
Sales Engineer
1855 Industrial Street, Los Angeles

PARSONS ENGINEERING CO.
San Francisco, Calif.

OR ANY JOBBER

SIMPLE TRUTHS ARE ENDURING

When I was a little shaver running around my grandfather's furnace shop, he used to tell me, "Boy, if you build an honest product and sell it honestly, you'll never have to worry about keeping customers. Even if you have to charge a little more for good workmanship, your customers will remember quality long after they forget price."

That was a mighty good policy 79 years ago and it's good today. It's like the Constitution—a little old-fashioned, but still reliable.

H. P. MUELLER,
President.

L. J. Mueller Furnace Co.
Milwaukee

MUELLER-MILWAUKEE

REDUCE
Operating Cost
— WITH —
SPRAGUE METERS
— AND —
SPRAGUE REGULATORS

SPRAGUE METER COMPANY
Bridgeport, Conn.
Los Angeles-San Francisco, Cal.

Forge Welding With Gas Heat

(Continued from Page 17)

gether. The roller welder is used in joining the heads to the completed circular section. From two to six sections are required for one tank. The ends of each alternate section are flared in a gas-fired furnace and pressed to allow the end of the next section to slide into it just far enough to form the required lap.

The patented roller welder has an overhead steel platform with rails and a carriage from which the pneumatic hammer and hold-down devices are suspended, operating back and forth by motor with remote control. Just below is a steel roll and mandrel over which the shell section rides and which serves as an anvil while the hammer is making the weld. The two gas fired forges on long steel supports are just far enough below the mandrel to straddle the lower portion of the shell wall. Rollers on arms inside the shell section hold the shell in position while it is rotated and welded. Air pressure on the hammers is 100 pounds and a force of about 2000 pounds is delivered by the hammer at a rate of 250 strokes per minute.

Each car tank has a manhole in the center section with a reinforcing plate rolled to the proper curvature welded into the center section. After welding, each section is re-rolled to shape. The saddle plate has a flued opening which is formed by cutting a 6-inch hole in the center of the plate with a gas torch. The center of the plate is then heated until the edges of the hole reach a temperature of approximately 2200°F. The saddle plate is then placed on a collar die and a plug is pulled through, forming the flued opening. This forms the lower portion of the manhole and has a neck of the correct diameter and radius to which a steel nozzle is welded. When all mechanical welding has been completed, there remains a flued opening in one head only. This opening has been used to insert the mandrel for welding the last circular seam and when the mandrel is withdrawn, a flanged and dished head or cap is inserted in this opening, forge hammer welded in place and crimped inwardly, after which the tank is complete.

As each section of the tank is welded, it is thoroughly annealed in a pit type furnace to a temperature of 1650°F. This furnace is fully equipped with automatic controlling and temperature recording appliances so that a record is maintained of the exact temperature of every portion of the tank section being heat treated. This furnace is gas-fired and burners are so arranged that no flames impinge directly upon the tank section.

After all circular seams are welded, the vessel is annealed in a ring type furnace, gas fired, and having gas burners so installed as to prevent the flame impinging upon the tank.

After annealing the tanks are ready for the final machining and drilling of the manway nozzle, after which same are subjected to test hydraulically as prescribed by various regulating bodies. Each seam is thoroughly hammered while under pressure in order to make absolutely certain of a sound weld.

After the testing has been completed the tanks are thoroughly cleaned, dried, and painted, ready for shipment.

The Columbiana Boiler Co. has gained an enviable reputation as a builder of quality forge welded products and is at this time installing additional welding equipment for the protection of such products; the welding fuel will continue to be transmutated natural gas. Natural gas is used basically for practically every heating operation in the plant.

■ ■

Computing Device Measures Radiator Requirements

A RADIATION Computer for use in estimating house-heating and air-conditioning requirements of buildings is being marketed by the Gas Industry Laboratories of Astoria, N. Y.

The instrument, which resembles a vacuum cleaner handle with a wheel at the floor end, is rolled along the length and

width of the floor, and then up the wall, thus measuring the three dimensions of the room, which are computed on an indicator set in the handle to give the cubic contents.

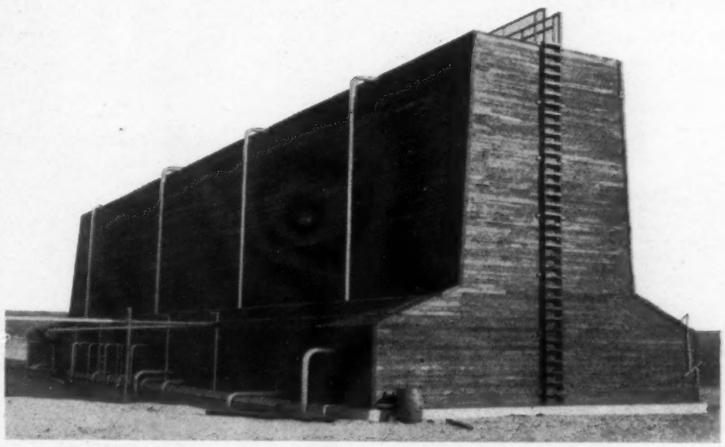
The instrument is 3 feet long and can be folded and placed in a small leather case. It is accurate and offers a quick scientific method of computing radiation requirements, as well as areas for floor coverings.

For estimating pipe for buildings, etc., it has been found useful in determining the lineal footage of pipe required. Street departments have found it of value in measuring lineal pipe runs for mains and service.

■ ■

Natural Gas Corp. Builds Avenal Office

Natural Gas Corp. of Calif., headquartering at Santa Cruz, announces the completion of a new office building to serve the town of Avenal, according to a report from G. A. Carrothers, district manager for the company at Taft. A stucco frame building, the new office features a unique display of modern appliances, both gas and electric lighting fixtures, and an air conditioning machine to keep the temperature even throughout the year. D. J. Yearout is the company's local representative in charge.



Just completed for Panhandle Eastern Pipe Line Co. at Liberal, Kansas, this tower eliminates drift and by means of induced draft maintains cooling within 5° F. of wet bulb.

PARKHILL-WADE, INC.

CONSULTING and CONSTRUCTION ENGINEERS

973 No. Main Street, Los Angeles, Calif.

Affiliated with Stearns-Roger Manufacturing Co. in the design and construction of

Gas Dehydration Units — Natural Gasoline Plants

Dust and Liquid Scrubbers — Stabilization Plants

Butane Storage and Handling Equipment

Butane Production Units

Announcing!... the new temperature relief valve that is reset after operating simply by turning a knob. No parts of any kind to replace!

Installed ahead of the thermostat, it prevents overheating by shutting off the gas supply when the danger point is approached. Consider these features.

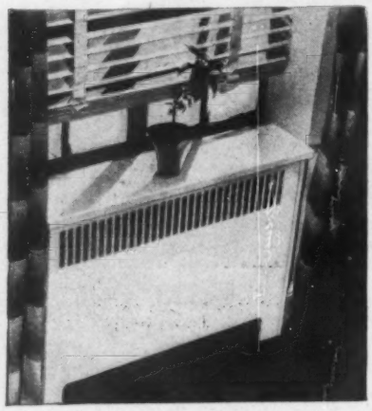
Gas men and water heater manufacturers are invited to write for particulars.

DOMESTIC MANUFACTURING COMPANY

700 East Slauson Ave. Los Angeles, Calif.

Amer. Radiator Announces Radiant Convector

AMERICAN Radiator Co., New York, N. Y., announces the introduction of the Arco Radiant Convector. Providing radiant heat for the company's concealed radiation, the new unit was designed to retain the advantages of the standard convector, including those of recessed or concealed radiators, space economy, accessibility for cleaning and modern appearance.



A live radiant heat panel of cast iron replaces the front section of a regular fin type convector heating unit so that this panel can be fitted flush to a specially prepared opening in the enclosure. Construction of the rest of the unit, and of the enclosure is standard, and the cast iron panel offers a uniform flat surface in the front of the enclosure.

Vertical lines in harmony with section connections and the vertical openings of the convector enclosure are cast in the front of the radiant plate to give a uniform appearance. The plate, finished in a priming coat of grey, can be painted with the enclosure.

■ ■

Publication Recounts Gas Uses in Beauty Shops

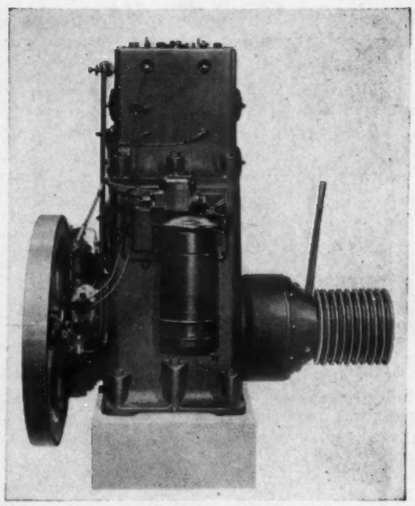
The American Hairdresser, a leading beauty magazine, devoted a seven-page section in its November issue to gas appliances used in beauty salons. Across the top of each page appeared this legend in big block letters: "Gas-Fired Equipment for Beauty Shops." Throughout the section was a running story describing these appliances, interspersed with advertisements of the manufacturers. The story consisted of detailed descriptions of hair dryers, water heaters, winter heaters and heating plants, hair waving iron heaters, air conditioners, and a gas-heated permanent waving machine.

■ ■

Porcelain Enamel Show Slated For January, 1937

The second in a series of demonstrations before trade groups showing how porcelain enamel is fused on metal will be conducted under the auspices of the Porcelain Enamel Institute during the National House Furnishings Show at the Stevens Hotel in Chicago, January 10-16.

The central feature of the Institute's exhibit is a miniature porcelain enameling furnace heated to 1560 degrees F., in which souvenir ash trays are fired.



New Cooper-Bessemer Pumping Engine

RATED 40 H.P. at 400 r.p.m., the "Type G-SD" vertical pumping engine has been announced by the Cooper-Bessemer Corp. The new unit is a 2-cycle vertical pumping engine which is suitable for clutch or straight pulley drive. Its construction features include counterbalanced crankshaft, heavy-duty roller bearings, and modern-type crossheads.

Standard equipment on the new engine includes air filter, water pump, lubricating-oil pump, and lubricating-oil filter. Either a constant-speed or variable-speed governor can be furnished. Equipment for driving a radiator fan, or for automatic air starting, is optional.

■ ■

Mainwaring Named Sales Head of Vancouver Utility

W. C. Mainwaring, formerly merchandise manager of B. C. Electric Railway Co., Vancouver, B. C., has been appointed general sales manager of the company and has been asked to create a unified sales program for the gas and electric departments of the company, according to news dispatches.

An October merchandising drive in Vancouver and Victoria in honor of Vice-presidents E. H. Adams and A. T. Goward resulted in total sales of $53,000, surpassing the $42,500 quota by $10,500. Many prospects were turned in by company employees.

■ ■

Mid-Continent Association Elects Moffitt President

At the November meeting of the Mid-Continent Oil and Gas Association held in Shreveport, La., L. M. Moffitt, of Triangle Drilling Co. of Shreveport, was elected president for the coming year. Vice-presidents named for the 1937 term were D. W. Harris, Arkansas-Louisiana Gas Co.; J. S. Hasson, Ohio Oil Co.; Charles G. Laskey, Belchic & Laskey; J. R. McWilliams, Standard Oil Co. of Louisiana; and C. R. Minor, Gulf Refining Co. Arthur Campbell was re-elected secretary and R. F. Sebastian was elected treasurer.

BUILD YOUR HOUSEHEATING LOAD WITH KLIXON CONTROLS

These two advanced Klixon devices give exact automatic temperature control and assure positive pilot protection for your gas-fired space heaters . . . provide sales features that make it easy to sell gas heating.

Write today for descriptive bulletins.

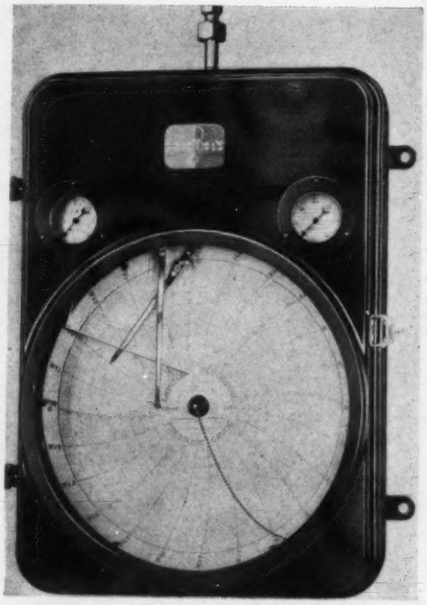
SPENCER THERMOSTAT COMPANY
Unit of Metals & Controls Corporation
34 FOREST STREET • ATTLEBORO, MASSACHUSETTS

AIR CONDITIONING
Electrogas
HEATING EQUIPMENT

FURNACES BLOWERS FILTERS WASHERS

Write for attractive Dealer proposition

ELECTROGAS FURNACE & MANUFACTURING CO.
2575 Bayshore Boulevard, San Francisco



Bristol Announces New Series Pneumatic Type Controllers

THE Bristol Co. announces a new series of pneumatic type controllers known as Ampliset free-vane controllers. These instruments are now available for automatically controlling temperature, time-temperature, flow, liquid level, pressure, time-pressure, and humidity. The Ampliset principle has also been combined with the Metameter, a system of telemetering recently announced by Bristol, for the remote control of steam pressure and gas pressure.

In the Ampliset controller certain features of field adjustability have been added to the free-vane system, whereby its sensitivity can be changed by means of a small screw to fit the lag peculiarities of the process on which it is used.

The sensitivity or throttling range of the instrument can be changed without removing the chart or chart dial. It can be changed without disturbing the operation of the controller or upsetting the operation or equilibrium of the process.

By the same adjustment that regulates the sensitivity of the Ampliset controller, the instrument can be changed from direct-acting to reverse-acting or vice versa. This change is made by simply turning the scale on the adjustment past the zero point.

■ ■

Heating Contract for Housing Project Goes to Mueller Co.

The I.. J. Mueller Furnace Co. of Milwaukee, Wis., has been awarded the contract to furnish 730 cast iron warm-air furnaces and 670 blowers for forced air circulation to be installed in the Greendale housing project at Hales Corners, a suburb of Milwaukee, Wis., according to advice from Washington. The installations will be handled and supervised by the Government. Resettlement Administration engineers, in designing the heating installations, have followed the current trend of forced warm air circulation in all but 60 installations which will be of the gravity type.

Power Engineers Entertained By Los Angeles Companies

Executives of the three Los Angeles gas companies entertained 200 members of Chapters Two and Four of the National Power Engineers Association at the Mona Lisa cafe on November 18. The occasion was featured by addresses by Addison B. Day, president and general manager of the Los Angeles Gas & Electric Corp.; F. S. Wade, president of the Southern Counties Gas Co.; and F. J. Shafer, vice-president and general manager of the Southern California Gas Co. Also present were Vice-Presidents A. F. Bridge and N. R. McKee of the Southern Counties Co. and F. M. Banks, vice-president of the Southern California Co. Clyde Potter, new business manager of the Southern Counties Co., acted as toastmaster.

■ ■

Gas Engine Installations

Recent installations of gas engines for local ice refrigeration companies by the Southern Counties Gas Co., Los Angeles, Calif., increased the total gas engine horsepower operating on the company's lines for industrial and agricultural purposes to 100,000, according to figures released last month.

■ ■

Missouri Natural Shifts Men

R. T. Dixon has been appointed local manager for the Missouri Natural Gas Co. in Festus, Mo., succeeding W. M. Williams, who has been transferred to the Farmington office. H. D. Boyd will continue as the company's sales representative.

GREENLEE

Here is the Solution to Your Pipe Pushing Problems

Hydraulic PIPE PUSHER

One man, standing in a comfortable position, can exert a pressure of 40,000 pounds on the pipe clamp.

Here is a real improved pipe pusher that permits one man to stand in a comfortable position and send pipe where it is wanted, simply by pumping the handles. It is compactly built, easy to handle and simple to set up and operate. Because of its time and labor-saving features, it is often able to pay for itself on the very first job.

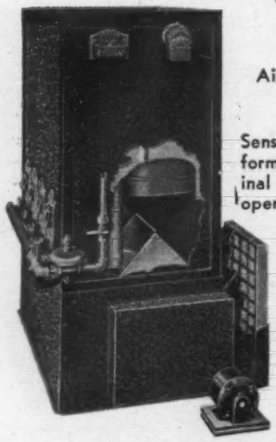
The Greenlee Hydraulic Pipe Pusher is self-contained. It operates on a notched steel base, which permits making a push of from 4 to 7 feet, depending on the length of base used, without changing the pipe clamp. When it reaches the front end of the base, it is pushed back to the opposite end, and the quick-acting clamp is then reset. Pumping the handles sets up a pressure within two oil cylinders to push the pipe. This provides a smooth-acting, powerful mechanism that is flexible and exceptionally simple. It will push pipe up to 4-inch, has eight speeds for varying soil conditions and will exert a maximum pressure of 40,000 pounds on the pipe clamp.

WRITE TODAY for COMPLETE DETAILS

GREENLEE TOOL CO., 1700 Columbia Ave., ROCKFORD, ILLINOIS

NEW LOW COST

FRASER



Gas Furnace
and
Winter
Air Conditioning
System

Sensational in performance, low original cost and low operating cost.

Write
for details
today.

Manufactured by

Fraser Furnace Company
Stockton, Calif.

Distributed by

H. R. Basford Company
San Francisco Los Angeles

NO-OX-ID stops waste of metal in gas washers and purifying boxes.

Adapted to All Service Conditions

NO-OX-ID lends itself to use under all service conditions. The combinations of NO-OX-ID used in protecting pipe are suitable for hand-field application or to machine application, either in the field or under your own supervision in your yard.

NO-OX-ID does not deteriorate in storage. It gives protection under all atmospheric and soil conditions.

Surveys and recommendations made gladly. Correspondence invited.

DEARBORN CHEMICAL COMPANY
Los Angeles: 807 Mateo Street, Phone TRinity 3385
San Francisco: 421 Bryant St., Phone SUtter 8688

Interior view of Monel Metal kitchen at the Desert Inn, Palm Springs, California.

All Monel Metal Ranges at Desert Inn

IN the kitchen of the Desert Inn, winter resort at Palm Springs, Calif., the Madsen Iron Works, of Los Angeles, recently installed a battery of gas ranges that are all Monel metal lined. The battery consists of three sections of ranges with ovens, one griddle top with oven, one griddle top without oven but with a specially constructed broiler, and a two-burner extension. The ovens are insulated and automatically controlled.

This equipment throughout is lined with Monel metal inside and the body and doors are Monel metal with chromium trim. A high-shelf of Monel metal runs the length of the installation. This is understood to be the only commercial cooking installation on the Pacific Coast utilizing Monel metal throughout and is on the lines of the Southern California Gas Co.

Natural Gas Rescues City From Fish Odors

Natural gas is coming to the rescue of Monterey, Calif., residents who have been complaining bitterly about the malodorous condition of the city due to processing of fish in the canneries of the city.

Refuse after canning and pressing out fish oil, is dried to make chicken feed and fertilizer. In the drying operation the moisture is taken out, and when the residue becomes overheated the resultant smells have caused the populace to protest. As a result the city passed ordinances requiring all gases from the driers to be passed into furnaces heated to 1400° Fahrenheit so that any odors would be eliminated. Pacific Gas and Electric Co. engineers worked out a gas fired burner to attain this temperature.

■ ■

R. R. Commission Postpones Texas Rate Cases

Pending final action on the Lone Star Gas Co. gate rate case by the Texas Supreme Court, the Railroad Commission announced last month indefinite postponement of a hearing for six affiliated distributing companies who were ordered to show cause why they should pay more than 32 cents per 1,000 cubic feet for gas at the gate. At the same time four of the distributing companies and Lone Star as intervenor filed an answer charging the commission would be in contempt of Federal and State courts if it takes any action to enforce or give effect to the 4-year old order reducing Lone Star gate rates. The case is now pending action of the Texas Supreme Court on Lone Star motion for rehearing. The distributing companies joining the issue are Texas Cities, Community Natural, County and Dallas gas companies.

■ ■

American Radiator Plans Tour For Heating Exhibit

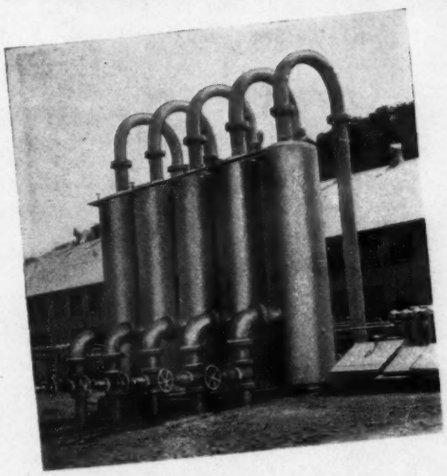
Tentative plans are now being made for a tour that will carry the American Radiator Co.'s exhibit of radiator heat conditioning, Castles Underground or the Cellar Reborn, throughout the Middle West in 1937. During five showings this year covering a period of 20 weeks, attendance reached 607,431 persons.

The exhibit, which comprises the world's largest collection of miniature rooms and shows air conditioning with all types of radiator heating systems in a series of 36 miniature settings for the modern basement, was presented in New York, Boston, Philadelphia, Pittsburgh, and on the boardwalk in Atlantic City.

BE SURE WITH FLUOR

COMPLETE engineering and construction service to the oil and gas industries for over forty-four years. The Fluor Corporation, Ltd., 909 East 59th St., Los Angeles, Calif.; 30 Church St., New York City; 909 McCormick Bldg., Chicago, Ill.; 703 Fairfax Bldg., Kansas City; 719 McBirney Bldg., Tulsa; 1406 Esperson Bldg., Houston, Texas.

PUBLIC RELATIONS ARE BETTERED



by Continuous Delivery of Cleaned Gas

Many companies have found that Blaw-Knox Gas Cleaners are a worthwhile investment for insurance of CONTINUOUS SERVICE, for FREEDOM FROM SERVICE COMPLAINTS, for BETTER PUBLIC RELATIONS.

Three forward looking companies have purchased a total of 89 BLAW-KNOX GAS CLEANERS. They are receiving ample proof of what they are getting for their money. They anticipate purchasing more as gas loads increase.

Gas loads are increasing—Peak loads are going to be higher than ever before.

If your lines and city gates are unprotected from dust storms, it may certainly be very embarrassing and inconvenient.

It is not too late to install BLAW-KNOX GAS CLEANERS *now* for this winter's peak loads.

BLAW-KNOX COMPANY

2033 FARMERS BANK BUILDING PITTSBURGH, PA.

Dearborn Chemical Builds Addition to Plant

The Dearborn Chemical Co. has completed an extension to their main manufacturing plant in Chicago. This is the third major addition in a dozen years and gives a 16 per cent increase in floor space, to be utilized for the installation of new equipment and for a modern machine shop.

The Dearborn Laboratories were also remodeled, and new equipment installed. Further improvements included the remodeling and air conditioning of the factory offices.

■ ■

Missouri G. & E. Service Co.

Under a new plan, recently adopted, control of the Missouri Gas & Electric Service Co. will be vested in a committee of seven, three to be appointed by Chicago investors, three by the local stockholders, and one by the federal court of Kansas City. Changes will be made in the operation and management of the company.

■ ■

Reynolds Regulator Offers Small Volume Model

REYNOLDS GAS REGULATOR CO., Anderson, Ind., announces its new R-10070-E2 gas regulator. Primarily for use on gas refrigerators, the regulator is equipped with automatic cut-off. It is also useful on pilot control or on any installation where accurate pressure control of small volume is required.

The body is designed of brass, spring type operation. This new model reduces pounds to inches W. C. On the low pressure refrigerator installation, regulator R-10070-E2 reduces the line pressure to satisfactory pressure for the operation of the low pressure refrigerator regulator.

■ ■

National Superior Company Changes Name

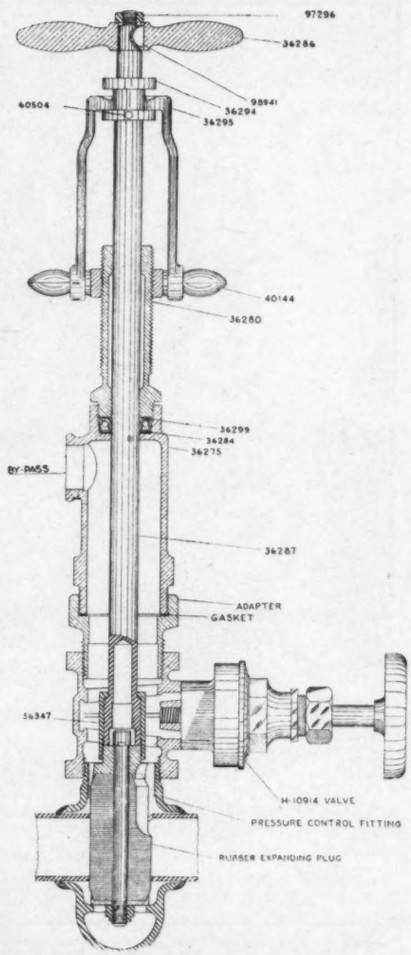
The National-Superior Co. (Dayton Pipe Coupling Division), Dayton, Ohio, changed its name on December 1 to The National Supply Co. of Delaware ,Dayton Coupling Division).

HYDRAUGER

MODERN HORIZONTAL BORING MACHINE

For Underground Installation of Pipe and Conduits. Avoids damage to costly pavements and saves time. Send for Bulletin.

HYDRAUGER CORPORATION, Ltd.
116 New Montgomery St.
San Francisco, Calif.



New Method of Tapping Mains Under Pressure

Exhibited at the gas appliance show during the American Gas Association convention in Atlantic City last month was a new line of stopping units and pressure fittings manufactured by the Mueller Co., Decatur, Ill. This equipment is used in maintaining uninterrupted service on distribution systems, making it unnecessary to shut off either high or low pressure lines to replace sections of main.

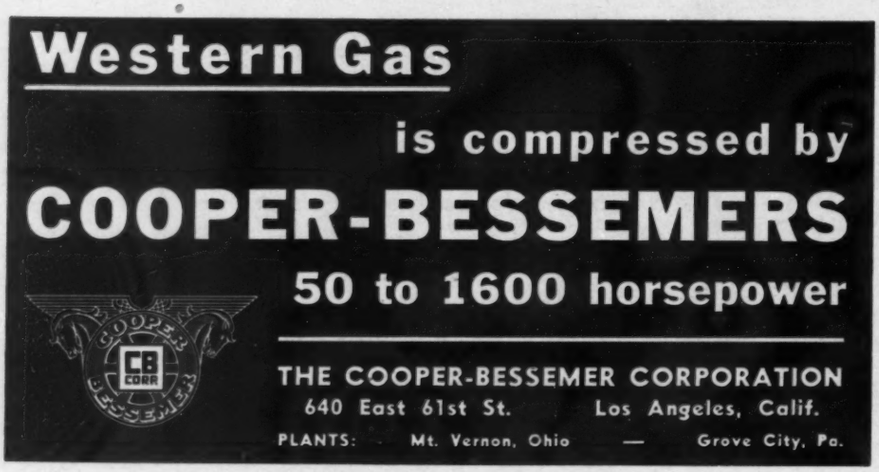
By installing a by-pass under pressure to maintain the supply, laterals, crosses, tee connections, or extending dead ends may be put in through use of the equipment without the loss of gas. Transmission line problems may be handled in the same manner with this equipment, making it possible to replace sections of high pressure mains without loss of gas or danger to workmen.

■ ■

Albuquerque Natural Gas Co. Becomes New Mexico Gas Co.

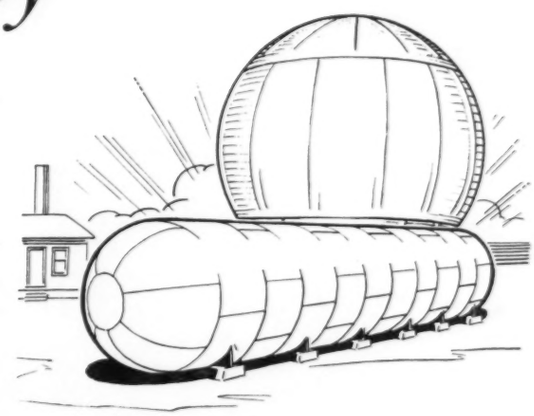
Through change in charter, the Albuquerque Natural Gas Co., Dallas, Tex., is now the New Mexico Gas Co., according to an announcement issued to the newspapers. The change in name became effective on October 26. J. R. Cole, district manager at Santa Fe, stated that there will be no changes in service or personnel.

BASO
THERMO ELECTRIC SAFETY CONTROL FOR GAS BURNING APPLIANCES
BOILERS ★ FURNACES ★ CONV. BURNERS ★ SPACE HEATERS ★ UNIT HEATERS ★ AIR CONDITIONERS OVENS ★ RANGES ★ WATER HEATERS, ETC.
MILWAUKEE GAS SPECIALTY CO.
MILWAUKEE ★ WISCONSIN
GAS VALVE SERIES 500
ELECTRIC SWITCH SERIES 600


Western Gas
is compressed by
COOPER-BESSEMERS
50 to 1600 horsepower
THE COOPER-BESSEMER CORPORATION
640 East 61st St. Los Angeles, Calif.
PLANTS: Mt. Vernon, Ohio — Grove City, Pa.

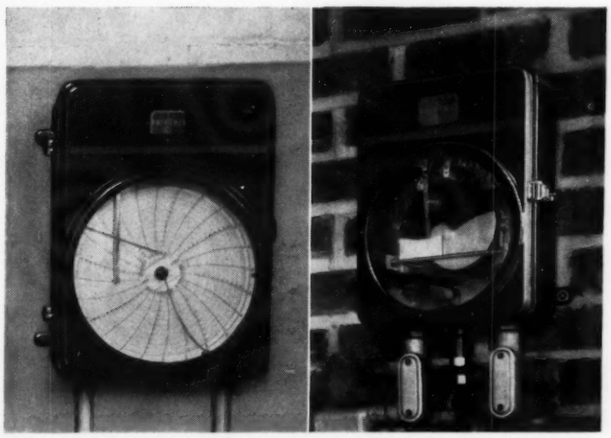
EYES

to help you watch holder pressure miles away



WHERE large volumes of gas under high pressure are transmitted over long distances to storage and then released through governor stations into the distribution system, it is important to know the pressure in the holder.

Is this too low for satisfactory service to the consumer? Is it too high? What does pressure indicate in the way of needlessly long pumping periods? Are pumping costs excessive? How does pressure fluctuate by day? How by night?



Left: Recording Receiver of Bristol's Metameter. Model M40MR. Note large, easy to read, 12 inch diameter chart. Right: Typical installation of Metameter Transmitter, Model M35T, for measuring pressure both in waterless high pressure gas holder and in supply line to holder.

Bristol's Metameter for telemetering pressure provides the answers—instantly, continuously, accurately and *inexpensively.* It consists of just three simple principal parts: (1) the transmitter at the distant point where, like a pair of ever alert "eyes", it continually watches the pressure being measured, (2) a simple two-wire circuit for conveying electric impulses proportional to measurements to (3) the recording receiver, conveniently located in your office, at the compressor station or other central headquarters.

Metameter works on a new principle. Fully described in Bulletin No. 424N, mailed on request.

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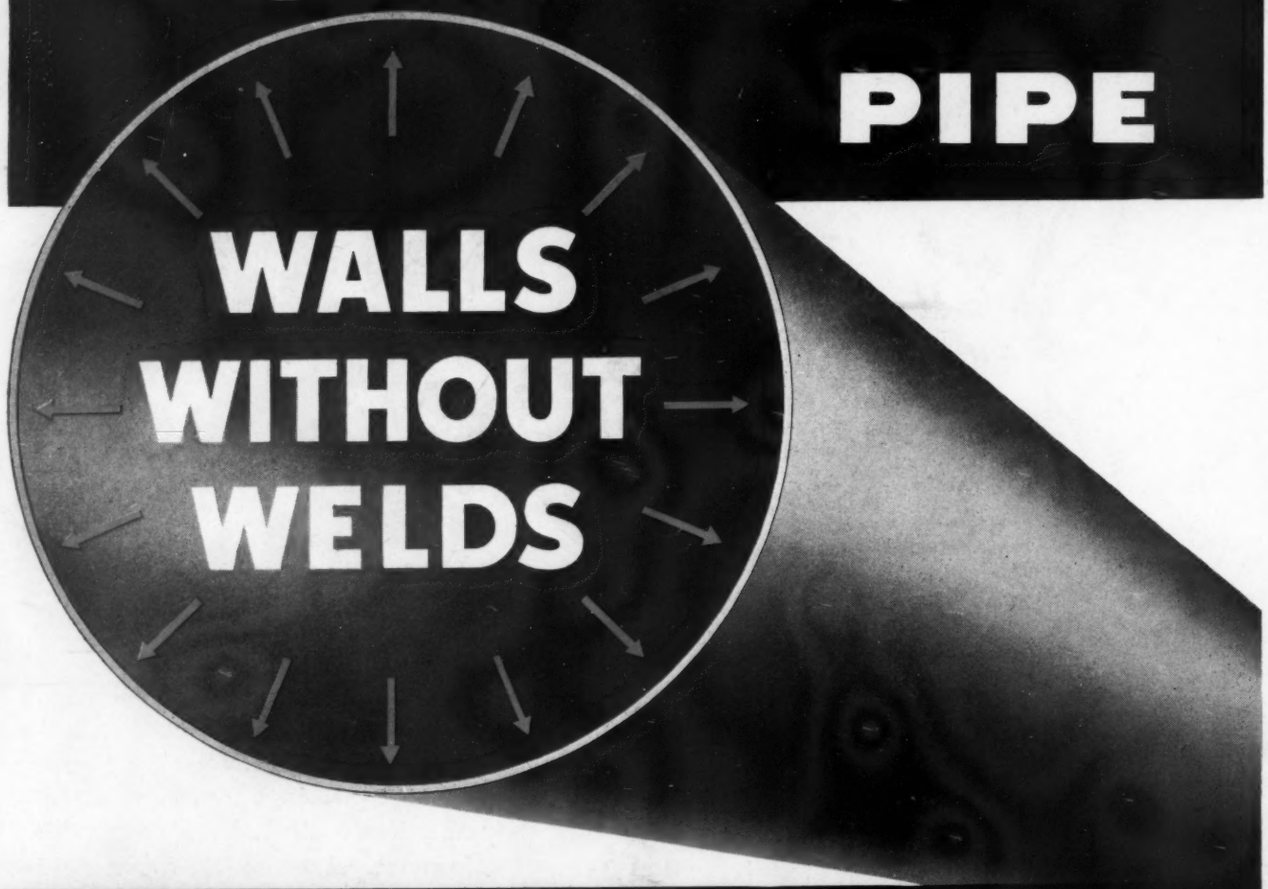

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